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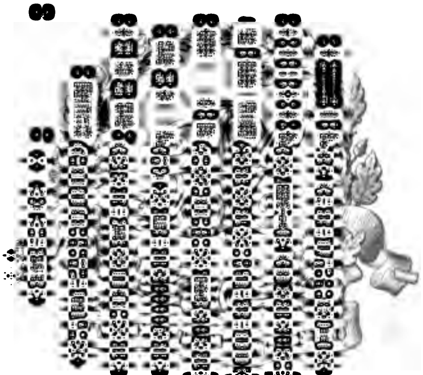

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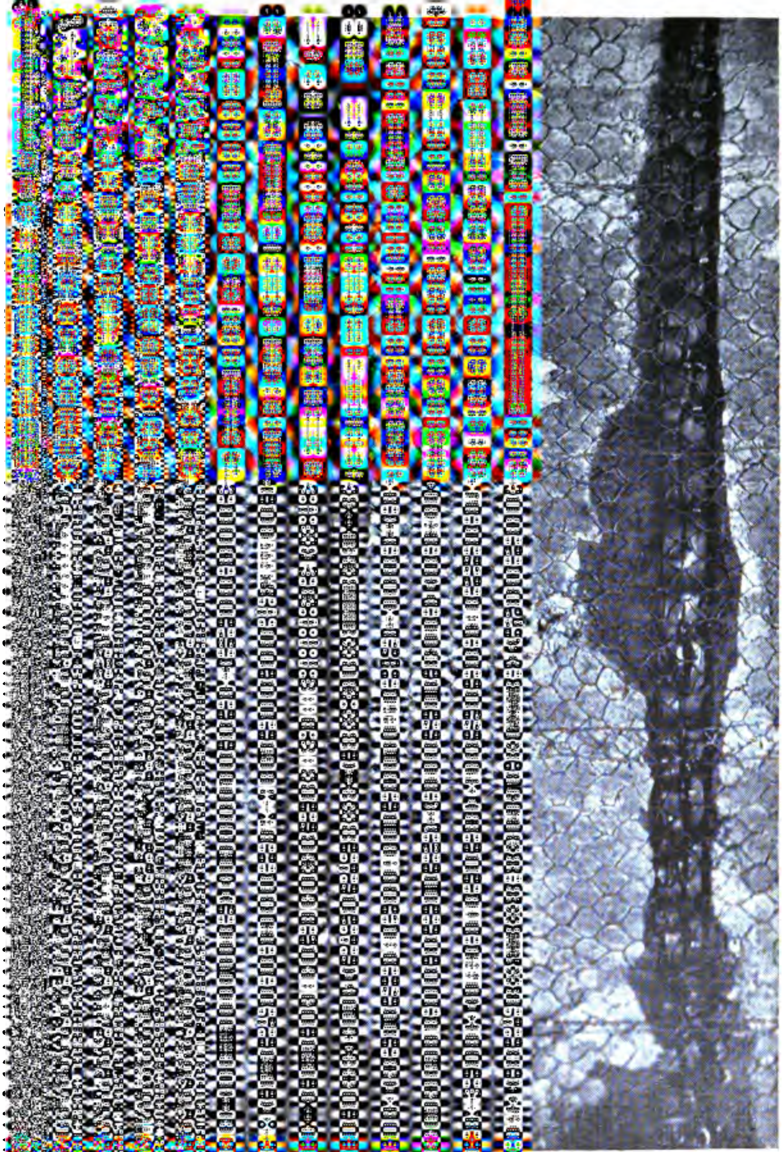

Publications of the
BRITISH FIRE PREVENTION COMMITTEE.—No. 47.
Edited by Edwin O. Sachs.

FIRE TESTS WITH PARTITIONS

A MATCH-BOARDED PARTITION, FILLED IN WITH SILICATE COTTON (SLAG WOOL),

BY

MESSRS. D. ANDERSON & SON, LTD., LONDON,

AND

MESSRS. J. C. BROADBENT & CO., LTD., LONDON.

The Committee's Report.

LONDON, 1900.

PUBLISHED AT THE OFFICES OF
THE BRITISH FIRE PREVENTION COMMITTEE
(Founded, 1897—Incorporated, 1899),
1, WATERLOO PLACE, PALL MALL.

Two Shillings and Sixpence.

HARVARD COLLEGE
AUG 3 1914

PUBLICATIONS
OF THE
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No. 4.—THEATRE EXITS.
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No. 27.—OFFICIAL FIRE TEST WITH PARTITIONS (No. 7).
No. 28.—OFFICIAL FIRE TESTS WITH CEILINGS (No. 8).
No. 29.—OFFICIAL FIRE TESTS WITH GLASS (No. 5).
No. 30.—OFFICIAL FIRE TESTS WITH GLASS (No. 6).
No. 31 —OFFICIAL FIRE TESTS WITH GLASS (No. 11).
No. 32.—OFFICIAL FIRE TESTS WITH GLASS (No. 12).
No. 33.—EXPERIMENTAL PLAIN GLASS TESTS (O, P AND Q).
No. 34.—EXPERIMENTAL FIRE TESTS WITH FLOORS (R).
No. 35.—EXPERIMENTAL FIRE TESTS WITH DOORS (S AND T).
No. 36.—OFFICIAL FIRE TESTS WITH TREATED WOOD (No. 9).

Printed by HAZELL, WATSON & VINEY, LD., London and Aylesbury.

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OBJECTS OF THE COMMITTEE:

The main objects of the Committee are :—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts, and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account to be read as expressions of opinion, criticisms, or comparisons.

NOTE.

It will be remembered that a test with a partition similar to the one here under consideration was undertaken in July, 1899, and reported on in publication No. 27.

In the prefatory note attention was called to the importance of the slag-wool being carefully packed, it having been found that the fire had only broken through where this packing was imperfectly executed.

To show how this question of satisfactory packing influenced the fire-resistance of partitions of this description, the two makers concerned very wisely immediately applied for a second test, where the packing was executed under the personal supervision of a responsible representative.

The result of this careful supervision is apparent, for no breaking through of the fire is recorded as in the earlier case.

Good workmanship with careful supervision has been rewarded, and the Executive congratulate the makers on the energetic manner in which they immediately demonstrated what was necessary to distinctly show the reason why the fire broke through in the first instance and not in the second.

EDWIN O. SACHS.

LONDON,
16*th March*, 1900.

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically, or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges, but these charges are so figured as to only just cover the actual cost. Any surplus is refunded. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman.*

OFFICIAL REPORTS

OF THE

British Fire Prevention Committee.

FOUNDED 1897.—INCORPORATED 1899]

FIRE TEST No. 20.—JANUARY 24TH, 1900.

A MATCH-BOARDED PARTITION FILLED IN WITH SILICATE COTTON (SLAG WOOL)

BY

MESSRS. D. ANDERSON & SON, LTD., LONDON,

AND

MESSRS. J. C. BROADBENT & CO., LTD., LONDON.

OBJECT OF TEST.

To record the effect of a fire of 45 minutes duration, commencing at 300° Fahr. and increasing to 1,800 Fahr., followed by the application of water for one minute on the outside and two minutes on the inside.

Note.—The area of the partition under investigation was about 75 ft. superficial, with a width of 10 ft.

SUMMARY OF EFFECT.

The internal boarding was completely destroyed.

The Slag Wool was fused and blackened on the inside face and a narrow strip down the side of each stud was blackened; it was damp from the water applied, but otherwise it was good and clean.

The studs were burned about ¾ in. deep on the inner edge.

The wire-netting was sound and not loose.

The studs were sound, white, and clean for a distance of 2¾ in. from the outer edge.

The outside boarding was sound, white and clean, both on the fire and passage side.

The fire did not pass through the partition.

The temperature read on the face of the partition next the passage remained the same during the test.

DESCRIPTION OF TESTING PLANT.

(*See Figs.* 1 *to* 4).

The Testing Chamber used was located at the Committee's Testing Station, and was known as No. 4 Hut.

The hut was constructed, as shown, of stock bricks with lime mortar and measured 10 ft. by 10 ft. internally.

The ceiling of the hut was 7 ft. 8 in. above the pavement of the chamber, and was formed of solid wood beams grouted with fire-clay.

The door-opening in the north wall measured 2 ft. by 5 ft. 9 ins., and was kept open during the test.

The fuel used was gas produced at the station, and the supply was regulated by valves and dampers.

The hut was divided as shown on plan, the partition being constructed from east to west, the full width of the hut, leaving a passage on the outside 1 ft. 9 ins. wide.

The gas was admitted through two mixing chambers of fire-brick, each 7 ft. 9½ ins. by 3 ft. as shown.

Two Roberts-Austen pyrometers were used for recording temperatures, one taking a continuous record from point No. 4, and one being used for observation records at points Nos. 1, 2 and 3. Points Nos. 1, 4, 3, were in the chamber and point No. 2 outside in the passage.

There were two observation holes, one in the east wall and one in the west wall, and two small observation

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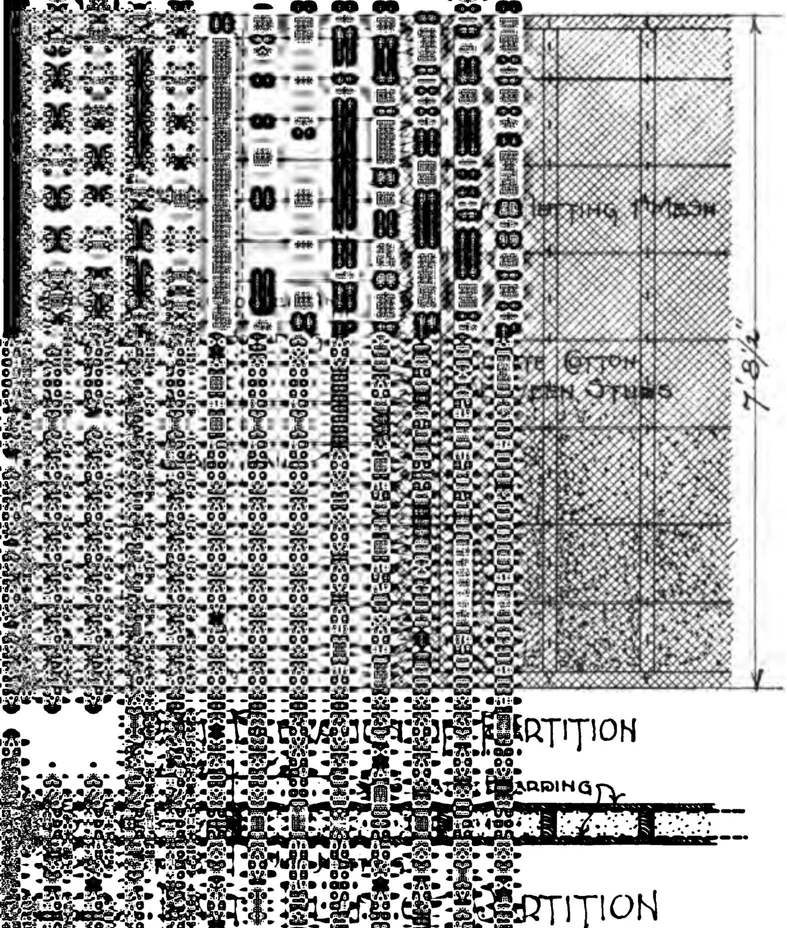

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CONSTRUCTION OF THE PARTITION.

(*See Figs.* 1 *to* 6).

On January 16th, 1900, the framing of the partition was put up. The partition measured 7 ft. 8½ in. high by 10 ft. wide, and was built across the hut east and west.

The studs, head and sill, were of 4-in. by 2-in. yellow scantling. The studs, which were 14½ in. centre to centre, were mortised into the sill, the head rested on the studs only, being nailed thereto.

The head was nailed to the beams forming the top of the testing chamber; the sill was laid on the floor of the hut.

Two thicknesses of asbestos mill-board, each $\frac{1}{16}$ in. thick, were nailed to the two end studs which abutted against the walls.

There were two iron supports from the partition to the north wall across the passage.

After the framing was erected, the joints along the walls and ceiling, on both sides, were pointed up with plaster.

The partition was covered on both sides with galvanized iron wire netting, 1 in. mesh, No. 19 gauge, and secured to the studs with 1¼-in. galvanized iron staples.

The space between the studs and the wire netting and the whole thickness of studs, viz., 4 in., was filled in with silicate cotton (slag wool) and thoroughly packed as it was put in.

The partition on both sides was covered with ¾-in. by 6 in. tongued, grooved and beaded matchboarding nailed to each stud with 2-in. clasp nails (2 to each stud).

PREPARATIONS FOR THE TEST.

On the inside of the hut, at the angle of the partition and ceiling, and in order to prevent the fire going over the top of the partition, a slab of silicate cotton (slag wool) pressed between wire netting to 1 in. thick was put up by the makers of the partition and secured to the ceiling with 3-in. screws, and to the partition with 2-in.

screws, 1¼-in. iron washers in each case being used. This slab went on to the ceiling 8 in. and on the partition 4 in. The joints, where the match-boarding abutted against the brick walls, were pointed up with plaster, and left until the test began on January 24th.

On January 22nd, the photograph in Fig. 6 was taken.

THE TEST.

On January 24th, 1900, the test was undertaken. The following is a log of the test:—

At 3 p.m. the meteorological observations taken at the Botanic Gardens, Regent's Park, read as follows:—

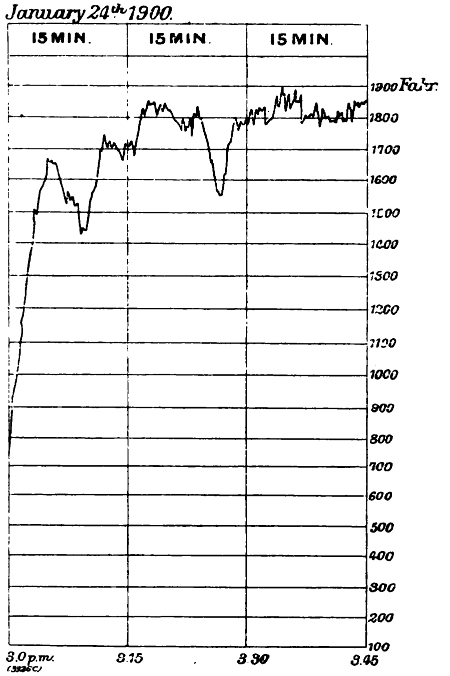
State of weather, overcast; Wind, W; Barometer, 29·62 in.; Attached Thermometer, 61° Fahr.; Dry Bulb, 53·2° Fahr.; Wet Bulb, 51·2° Fahr.; Remarks, dull, with showers of rain.

The following temperature observations were taken during the test from points Nos. 1 and 3 (inside the chamber), and No. 2 (outside the chamber).

OBSERVATIONS TAKEN AT POINTS NOS. 1, 2 AND 3.
(*From* 3.6 *p.m. to* 3.51 *p.m.*)

TIME.	INSIDE.		OUTSIDE.
	Point No. 1.	Point No. 3.	Point No. 2.
3.6 p.m.	1550° Fahr.	1550° Fahr.	—
3.9 "	1400° "	1400° "	—
3.12 "	1640° "	1600° "	—
3.15 "	1620° "	1540° "	—
3.18 "	1650° "	1710° "	—
3.21 "	1650° "	1650° "	—
3.24 "	1550° "	1650° "	—
3.27 "	1680° "	1720° "	—
3.30 "	1750° "	1700° "	—
3.33 "	1800° "	1700° "	—
3.36 "	1800° "	1700° "	—
3.39 "	1800° "	1740° "	—
3.42 "	1805° "	1790° "	—
3.45 "	1840° "	1800° "	—
3.48 "	870° "	1350° "	—
3.51 "	180° "	550° "	—

The following is the automatic record taken at point No. 4 (inside the chamber).



At 3 p.m. the partition was intact.

At 3 p.m. the gas was lighted.

At 3 p.m. the thermometer hung on the outside of the partition, in the centre on the 8th, 9th and 10th boards from the bottom, stood at 54° Fahr.

At 3.5 p.m. the boarding on the inside face of the partition was well alight and blazing freely all over.

At 3.8 p.m. the inside boarding was much charred.

At 3.10 p.m. smoke in passage-way coming from the outside through the draught holes.

At 3.13 p.m. the outside boarding was cool to the touch.

At 3.19 p.m. some of the internal boarding had fallen, exposing the wire netting, the amount fallen being about one quarter of the whole area.

At 3.24 p.m. all the boarding on the inside had fallen except some small pieces on the studs. Where the boarding had fallen from the studs the latter were flaming.

At 3.29 p.m. all the boarding had fallen off the studs and the latter were flaming freely the whole height.

At 3.31 p.m. the outside boarding was cool to the touch, and the thermometer stood at 54° Fahr.

At 3.45 p.m. the 15th and 16th boards (from the bottom) were just warm to the touch in the centre.

At 3.45 p.m. the gas was shut off. The face of the slag wool towards the fire side appeared incandescent all over.

At 3.46½ p.m. water was applied to the inside face of the partition, average pressure 20 lbs., for two minutes.

At 3.48½ p.m. water was turned off and the test was closed.

OBSERVATIONS AFTER TEST.

(*See Figs.* 6, 7).

On January 25th, 1900, the photograph in Fig. 7 was taken, showing fire side of partition.

Note.—No photograph was taken on the passage side, as there was no change to record from what was shown in Fig. 6 taken before the test.

On January 26th, 1900, the following observations were made at 3.30 p.m.

The inner surface of the slag wool was pitted in a few places by the stream of water, the greatest depth being about ¾ in.

The inner face of the slag wool was fused all over about ¼ in. deep; the whole was damp from the water applied; the edges next the studds were blackened for about 1 in. inwards.

The slag wool, except the fused face, was as good as when it was put in.

The wire netting was sound and good, the studs not burnt in deep enough to set the staples holding the wire netting, free.

The studs were burnt and charred to a depth of ¾ in. at the deepest point; those worst burnt were directly in front of the gas flame. The remaining portions of the studs were blackened by smoke about ½ in. deeper than the charred portions, and an average of 2¾ in. of the studs was white and clean as when fixed. The whole of the boarding on the passage side of the partition was clean, white and sound.

GENERAL ARRANGEMENTS.

The test was carried out according to the procedure laid down by the Executive for investigations of this description and conducted by a Sub-Committee of the Executive, comprising :—

Mr. Max Clarke, A.R.I.B.A.
Mr. F. R. Hammond, F.R.I.B.A., District Surveyor, East Hampstead.
Mr. Ellis Marsland, District Surveyor, Camberwell.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.

The Executive was represented by :

Mr. Edwin O. Sachs (Chairman).
Mr. Chas. E. Goad, M.Am.S.C.E.

The Commercial Section was represented by :

Mr. F. R. Farrow, F.R.I.B.A. (Chairman).

The Members' Testing Sub-Committee was represent by :

Mr. George E. Monckton, M.A.

The general body of members was represented by :

Mr. F. S. Capon, Architect's Department, L.C.C.
Mr. Thos. Leach, Chief Officer, Wimbledon Fire Brigade.
Mr. N. B. McDermott, late Surveyor, War Office.
Mr. Dennett H. Barry.

Messrs. Anderson and Broadbent were represented by
Mr. G. A. Herdman, Mr. R. Last, Mr. J. Porteous,
Mr. Wm. Reid.

The following visitors attended by special invitation of the Executive:

Mr. G. Nelson and Mr. D. A. Symons.

Signed,

For the Sub-Committee conducting the test:
MAX CLARKE (*Directing Member*).

For the Commercial Section:
FREDERIC R. FARROW.

For the Executive:
EDWIN O. SACHS.

Published by the Committee as directed by the Executive.
H. S. TAYLOR
(*Assistant Secretary*).
Date—15th March, 1900.

Verified a true copy of the Report ordered to be published.
WILLIAMSON, HILL & Co.
(*Solicitors*).
Date—25th March, 1900.

Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 48.

Edited by Edwin O. Sachs.

FIRE TESTS WITH FLOORS.

A FLOOR
OF
DEAL JOISTS WITH COKE BREEZE CONCRETE.

Particulars
OF
EXPERIMENTAL FIRE TEST.

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LONDON, 1900.

PUBLISHED AT THE OFFICES OF
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(Founded, 1897—Incorporated, 1899),
1, WATERLOO PLACE, PALL MALL.

Two Shillings and Sixpence nett.

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No. 30.—OFFICIAL FIRE TESTS WITH GLASS (N. 6).
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No. 32.—OFFICIAL FIRE TESTS WITH GLASS (No. 12).
No. 33.—EXPERIMENTAL PLAIN GLASS TESTS (O, P, AND Q).
No. 34.—EXPERIMENTAL FIRE TESTS WITH FLOORS (R).
No. 35.—EXPERIMENTAL FIRE TESTS WITH DOORS (S AND T).
No 36.—OFFICIAL FIRE TESTS WITH TREATED WOOD (No. 9).

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OBJECTS OF THE COMMITTEE.

The main objects of the Committee are:—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account intended to read as expressions of opinion, criticisms, or comparisons.

NOTE.

The investigation described in this report was undertaken with a view of demonstrating the resistance offered by a floor which, whilst being in every way constructed in such a manner as to comply with Section 74 of our Building Act, would not present those features which are generally associated with so-called "fire-resisting" floors.

As indicated, a special section of the Building Act was kept in mind when the details of this investigation were arranged, but it was soon evident when preparations were being made that the reading of our Regulations is the subject of considerable controversy, not only amongst those who have to design their buildings to meet the official requirements, but also amongst those whose duty it is to see that the law is complied with.

Whether the floor actually complies with the official requirements or not, this test should certainly be classed amongst the most interesting undertaken by this Committee, and I take the opportunity in this note to show how Mr. Fred. R. Farrow, the Chairman of our Commercial Section, who differs with me as to the question of compliance, bears out my estimate of the usefulness of this test, for he has annotated the report as follows:—

> "On behalf of the Commercial Section, I consider that the test herein reported is of value as furnishing useful information, quite irrespective of the question whether the floor tested was, as the Executive were advised, a "fire-resisting" floor complying with the requirements of the London Building Act under Section 74, or was, as I personally am of opinion, not in compliance with those requirements."

As to the question of compliance or non-compliance, I would, however, also take the opportunity of expressing my great regret that our Regulations contain clauses that can so easily be read in more than one way, and that it has even been necessary for the London County Council to issue to its District Surveyors an explanation, or what should be better termed its "reading" of the Law, whilst the general public has not been similarly advised as to the construction officially put upon certain technical words.

The word 'joist,' for instance, can, according to the latest official reading, describe either iron, steel, a hard-wood, or a soft-wood joist; but that there should be such an official "reading" is probably unknown to most professional men.

In order to understand what is desired, it is therefore necessary nowadays to read the Act in conjunction with the addition of Schedule II. passed by the London County Council early last year, and duly published, and further to read the circulars issued to the District Surveyors, when the question of this Committee's floor tests was having some official attention. It would be well that this were properly known, as otherwise many of us who like to employ a little common sense might not be able to descriminate between the joist which is the official joist, and the other joist which is merely the ordinary joist, which architects generally have in mind when speaking of fire-resisting floors.

But, fortunately, as I have said on an earlier occasion, it is common sense rather than the Law that will tend to give our Metropolis a greater fire-resistance.

For the Law apparently not only allows us to build with any kind of joist available, but has actually forgotten to ask for some protective covering for these joists.

EDWIN O. SACHS.

LONDON,

3rd May, 1900.

EXPERIMENTAL FIRE TESTS

CONDUCTED BY THE EXECUTIVE

OF THE

British Fire Prevention Committee.

[FOUNDED, 1897.—INCORPORATED, 1899.]

FIRE TEST Aa.—FEBRUARY 7TH, 1900.

A Floor of Deal Joists and Coke Breeze Concrete.

OBJECT OF TEST.

To record the effect of a fire of one hour and a quarter, commencing with a temperature of 500° Fahr., gradually increasing to a temperature not exceeding 2,300° Fahr., followed by the application of a stream of water for three minutes.

Note.—The area of the floor under investigation was to be 100 feet superficial in the clear (10 ft. by 10 ft.).

The floor was to be loaded with 100 lbs. per foot distributed.

The time allowed for construction and drying was six weeks (Winter).

SUMMARY OF EFFECT.

In 15 minutes all the boarding to the soffit was consumed.

In 54 minutes the flame came through the floor between the last joist and wall.

In 60 minutes the floor had deflected and the concrete had cracked transversely.

In 74 minutes the concrete between the two east joists fell.

In 82 minutes the floor and load collapsed.

The joists were found broken in the centre, and the bottom edge charred about 2 to 2½ in. up. The floor boards were but slightly injured.

DESCRIPTION OF TESTING PLANT.

(*See Figs.* 1 *to* 4.)

The testing chamber was located at the Committee's Testing Station, and was known as "No. 1 Hut."

The chamber was constructed, as shown, of stock bricks with lime mortar, and measured 10 ft. by 10 ft. internally.

The ceiling of the floor tested was 7 ft. 9 ins. above the pavement of the chamber.

The hut was covered in every night with tarpaulins.

The door-opening on the north side measured 2 ft. 6 ins. by 6 ft. 6 ins., and was bricked up on the morning of the test.

The fuel used was gas produced at the station, and the supply was regulated by valves and dampers.

The gas was admitted through two mixing chambers of fire-brick, each 10 ft. by 3 ft., as shown.

Two Robert-Austen pyrometers were used for recording temperatures, the first to take a continuous record from point No. 5, and the second to take five observation records from points 1, 2, 3, 4, and 6.

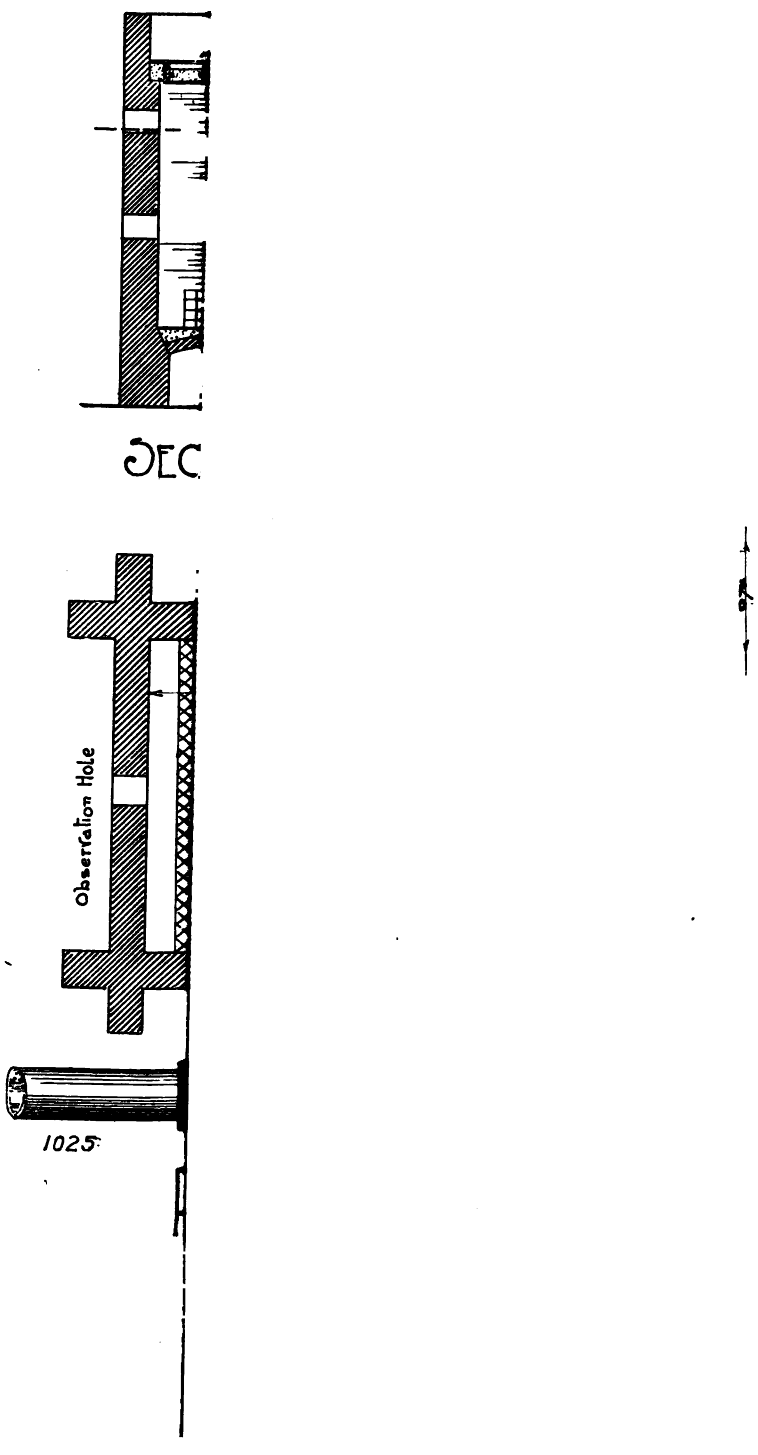
The load was of bricks, distributed evenly over the surface of the floor.

There were two observation holes in the north wall, one in the east wall, one in the west wall and one in the south wall in door-opening.

The draught holes were in the east and west walls.

The photographs were taken by daylight.

The stream of water was applied through a branch with ½-in. nozzle, and supplied from a manual fire engine equipped with a pressure gauge.


SEC
Observation Hole
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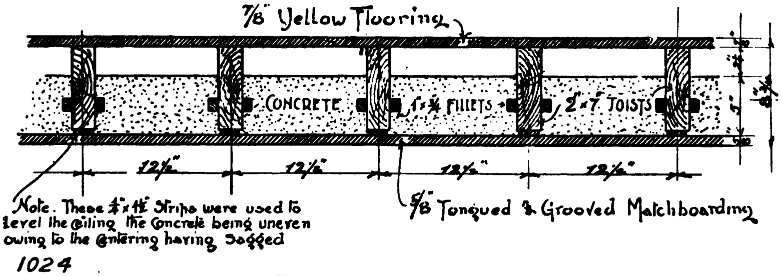
CONSTRUCTION OF THE FLOOR.

(See Figs. 1 *to* 5.*)*

The construction of the floor, illustrated in Figs. 1 to 5, was as follows :—

On December 11th, 1899, wood centering was put up to support the concrete.

On the same day fir joists, 7 in. by 2 in., were fixed across the hut from north to south, on the 4½ in. offset of the walls, and 12½ in. centre to centre. Wood fillets, 1 in. by ¾ in., were nailed to the sides of joists, the lower edge being 2 in. above the bottom of the joist to support the concrete, as shown in Fig. 5.



7/8" Yellow Flooring
CONCRETE
1×¾ FILLETS
2×7 JOISTS
12½"
12½"
12½"
12½"
Note. These ¾"×1½" Strips were used to level the ceiling the Concrete being uneven owing to the Centering having sagged
5/8" Tongued & Grooved Matchboarding
1024

THE FLOOR. *Fig.* 5. DETAIL.

Concrete was filled in on the top of the centering and between the joists to the depth of 5 inches.

The concrete was composed of coke breeze and Portland cement in the proportion of five parts of coke breeze and one part of Portland cement.

The coke breeze was obtained from the gas works at Kensal Green, and was dry before being used.

The cement was obtained in the open market.

The concrete was turned over four times dry and four times wet and was mixed in batches of ¾ of a yard at a time. The quantity of water used for each batch was 16·25 gallons.

The concrete was carried to the floor in buckets and filled on to the centering between the joists in two layers of 2½ inches each, which were trodden in and beaten with the flat side of a shovel.

Note.—Owing to the frosty weather which prevailed during the construction of the floor, two coke fires were kept close to the concrete while being mixed, and the water was raised to a temperature of 65° Fahr. As soon as the concrete was put in it was covered over with double sacks, and the hut was covered over with a tarpaulin, and all openings were closed to keep out frost.

On January 7th, 1900, the centering was removed, having been up 27 days.

Owing to the uneven surface of the concrete on the underside, caused by the centering having sagged, small strips of deal, ¼ in. by 1½ in., were nailed to the bottom of each joist, so as to obtain a level surface.

To the soffit of the floor, ⅝ in. tongued and grooved match-boarding was fixed, and a floor of ⅞ in. straight joint boards was laid on top of joists.

On December 15th, during the operation of concreting, the weather report was as follows:—State of weather, overcast; Wind, N.W.; Highest in the air, 27° Fahr.

During December the rainfall for the month (taken at Camden Square) was 1·05 in., with a maximum of 2·2 in. on December 1st. The maximum temperature was 55·3° Fahr., and the minimum 21·8° Fahr.

During January the rainfall for the month (taken at Camden Square) was 2·92 inches, with a maximum of ·47 inches on January 1st. The maximum temperature was 53·9° Fahr. (January 24th); minimum, 25·8° Fahr. (January 14th).

The hut was covered up with a tarpaulin until the morning of the test.

PREPARATIONS FOR THE TEST.

On February 3rd, 5th and 6th, the area of the floor, to an extent of 81 square feet, was loaded with bricks weighing 8,100 lbs., making a load equal to 100 lbs. per square foot

THE TEST.

On February 7th the test was undertaken. The following is the log of the test:—

At 3.45 p.m. the floor was intact.

At 3 p.m. the Meteorological observations taken at the Botanic Gardens, Regent's Park, read as follows:—

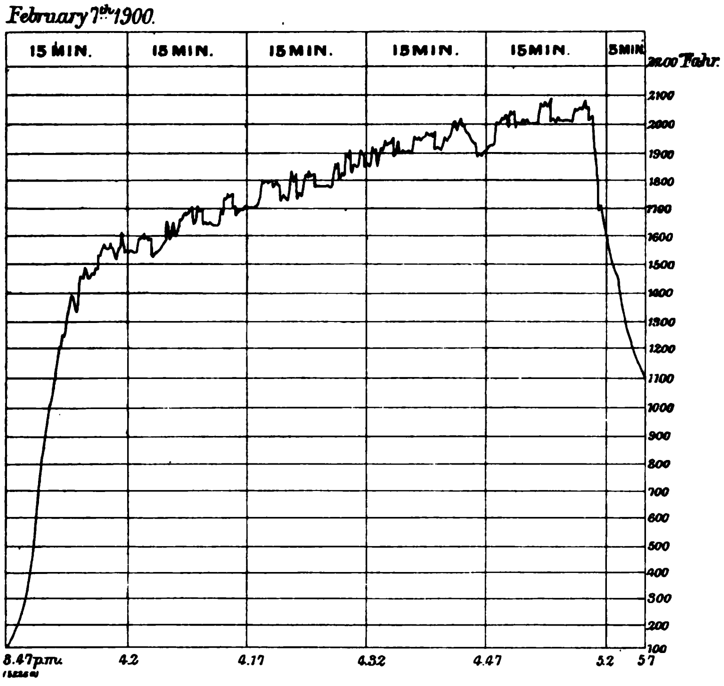
State of weather, cloudy; Rain, none; Wind, N.; Barometer, 29·69 in.; Attached Thermometer, 44° Fahr.; Dry Bulb, 36·70° Fahr.; Wet Bulb, 34·2° Fahr.; Remarks, fine afternoon.

The table and diagram given below show the temperatures taken from the five pyrometer observation points in the hut, as shown on the drawings as Nos. 1, 2, 3, 4 and 6, and one automatic record from point No. 5.

OBSERVATIONS TAKEN AT POINTS NOS. 1, 2, 3, 4 AND 6.

From 3.50 *p.m. to* 5.0 *p.m.*

TIME.	No. 1.	No. 2.	No. 3.	No. 4.	No. 6.
	Fahr.	Fahr.	Fahr.	Fahr.	Fahr.
3.50 p.m.	110°	360°	350°	380°	350°
3.55 ”	500°	1,150°	1,200°	1,250°	1,200°
4.0 ”	800°	1,400°	1,445°	1,400°	1,420°
4.5 ”	1,050°	1,450°	1,500°	1,510°	1,440°
4.10 ”	1,050°	1,480°	1,500°	1,600°	1,550°
4.15 ”	1,290°	1,550°	1,600°	1,680°	1,600°
4.20 ”	1,300°	1,600°	1,650°	1,720°	1,650°
4.25 ”	1,420°	1,600°	1,650°	Junction here broke and was renewed.	1,700°
4.30 ”	1,420°	1,700°	1,750°	1,400°	1,650°
4.35 ”	1,500°	1,750°	1,850°	1,940°	1,750°
4.40 ”	1,540°	1,800°	1,900°	1,950°	1,800°
4.45 ”	1,600°	1,850°	1,950°	2,000°	1,850°
4.50 ”	1,600°	1,850°	1,920°	2,000°	1,850°
4.55 ”	1,650°	1,900°	2,000°	2,050°	1,900°
5.0 ”	1,700°	1,850°	1,970°	2,100°	1,920°



At 3.47 p.m. the gas was lit.

At 3.50 p.m. steam appeared through the joints of flooring.

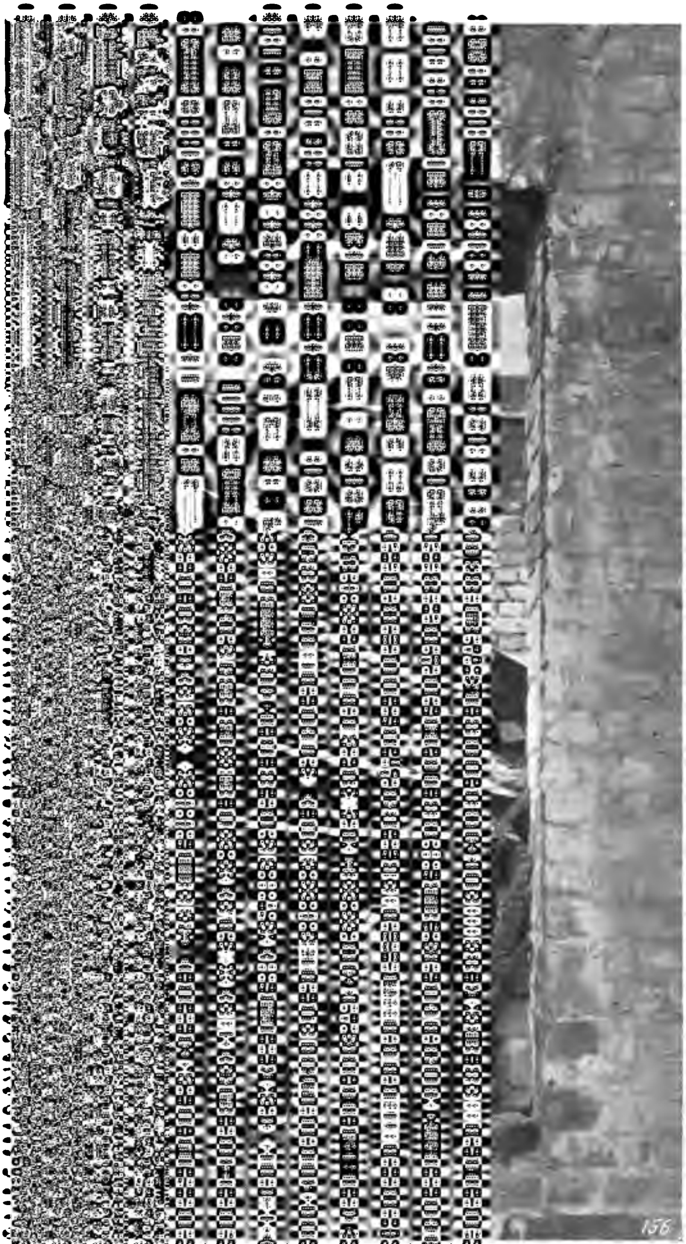
At 3.51 p.m. the match boarding to ceiling commenced to burn.

At 4.1 p.m. the charred remains of the match boarding commenced to fall off in flakes.

At 4.5 p.m. only the charred remains of two widths of match boarding were left in position, and the soffit of wooden joists were burning freely.

From the commencement of test until 4.12 p.m. volumes of vapour appeared above the floor, especially driving out at edges of flooring next brick parapet.

At 4.36 p.m. the lower edges of joists were much charred, so that a space appeared between the concrete and the wood joists.



[illegible] 7. [illegible] ENING OF TESTING
[illegible] OR.

At 4.41 p.m. flame appeared through flooring on east side against parapet, coming up the side of east joist where no fillet was fixed (*see section*, *Fig.* 1), and igniting the ends of floor boards for about 9 inches.

At 4.47 p.m. the floor had deflected in the centre, and the concrete between the joists in the 3 centre bays was cracked transversely.

At 5.1 p.m. the concrete between the 1st and 2nd joists on the eastern side fell in, and a full burst of flame appeared along the space thus formed.

At 5.2 p.m. the gas was turned off and the brickwork in door-opening was pulled down. The soffit of the concrete was found to be incandescent, and flame appeared on the western side by parapet.

From 5.3 to 5.9 p.m. water was turned on to the soffit of floor.

At 5.9 p.m. the whole of the floor and load collapsed, falling into the interior of the hut, and continued to burn until extinguished by water.

Note:—It was observed that the floor boards were only discoloured by the smoke and were not charred except at the E. and W. ends.

At 5.10 p.m. the test was concluded.

OBSERVATIONS AFTER TEST.

(*See Figs.* 6 *and* 7.)

On February 8th the photographs shown in Figs. 6 and 7 were taken.

On February 8th the remains of the floor were examined, and it was found that:—

The floor boards were uninjured except at the E. and W. ends.

The joists were found to be charred and burnt for about 2 to 2½ inches up, the remaining portion being fairly sound.

Note.—There being no fillet on the E. and W. side of the two end joists, the flame travelled up the side of the joists and ignited the boarding. These two joists were much more damaged than the rest.

The joists were broken in the centre.

The concrete was slightly disintegrated on the underside, and was broken by the fall into lengths of from 12 ins. to 18 ins.

GENERAL ARRANGEMENTS.

The test was carried out in accordance with the procedure laid down by the Executive for investigations of this description, and conducted by a Sub-Committee, comprising:—

Mr. Ellis Marsland, District Surveyor, Camberwell.
Mr. Frederic R. Farrow, F.R.I.B.A.
Mr. Max Clarke, A.R.I.B.A.
Mr. E. Woodthorpe, M.A., F.R.I.B.A.

Note.—Mr. F. R. Farrow having been injured at 4.2 p.m., Mr. Max Clarke took his place on the Sub-Committee.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.

Mr. H. B. White, M.I.E.E., superintended the instrument room.

The Council was represented by:—

Sir John Taylor, K.C.B. (H.M. Office of Works).
Mr. H. H. Collins, F.R.I.B.A., F.S.I., Past-President District Surveyors' Association.

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Mr. Chas. E. Goad, M.Am.Soc.C.E.

The Commercial Section was represented by:—

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Lieut.-Col. J. Colquhoun (London Non-Flammable Wood Co.).
Mr. J. F. Golding (The Expanded Metal Co.).
Mr. J. D. O'Brien (The Columbian Fireproofing Co.).
Mr. H. J. Joseph (The Asbestos & Asbestic Co.).
Mr. F. B. Passmore (The British Uralite Co.).
Mr. C. Petri (The Mural Decoration Syndicate).
Mr. H. B. Tarry (The British Uralite Co.).
Mr. F. Wallers (Dowson, Taylor & Co.).
Mr. G. A. Williams (G. A. Williams & Son).

The general body of members was represented by:—

Mr. Arthur Crow, A.R.I.B.A. (District Surveyor, Whitechapel).
Mr. Bernard Dicksee, A.R.I.B.A. (Dist. Surveyor, E. Newington).
Mr. E. Dru Drury, F.R.I.B.A., F.S.I. (District Surveyor, St. Margaret's).
Mr. W. Grellier, F.R.I.B.A., (District Surveyor, Clapham).
Mr. F. W. Hamilton, A.R.I.B.A. (District Surveyor, N. Fulham).
Mr. A. J. Handford.
Mr. E. R. Hewitt, A.R.I.B.A. (District Surveyor, St. Saviour's).
Mr. Geo. McDonell, A.R.I.B.A. (District Surveyor, Islington).
Mr. Hugh McLachlan, A.R.I.B.A. (District Surveyor, West Division, City of London).
Mr. S. F. Monier-Williams, A.R.I.B.A. (District Surveyor, S. Fulham).
Mr. R. Notley F.R.I.B.A., F.S.I. (District Surveyor, Bethnal Green).
Mr. L. E. Aulagnier (Westminster Fire Office).
Mr. A. Saxon-Snell.
Mr. George Tolley.

The following visitors attended by special invitation of the Executive :—

Mr. F. G. Hamilton (Royal Exchange Assurance); Mr. H. King (Royal Exchange Assurance); Mr. Matt Garbutt, A.R.I.B.A., A.M. Inst. C.E.; Mr. W. A. Scott, A.R.I.B.A.; Mr. Geo. Pritchard; Mr. H. L. Cunnah.

Signed,

For the Sub-Committee conducting Test:
ELLIS MARSLAND (*Directing Member*).

For the Commercial Section:
FREDERIC R. FARROW.

For the Executive:
EDWIN O. SACHS (*Chairman*).

Published by the Committee as directed by the Executive.

H. S. TAYLOR
(*Assist. Secretary*).

Date—April 27th, 1900.

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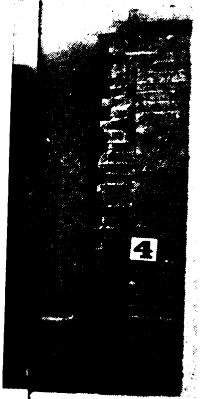

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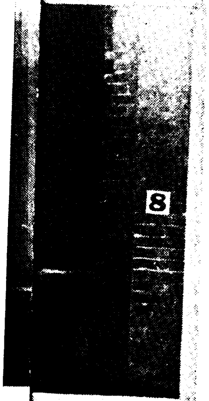

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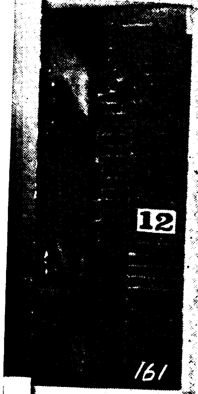

TEMP 2000°

to

Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 49.

Edited by Edwin O. Sachs.

FIRE TESTS WITH DOORS.

A $2\frac{5}{8}$-in. DOOR OF ARCHANGEL DEAL, CONSTRUCTED IN THREE THICKNESSES.

A $2\frac{5}{8}$-in. DOOR OF QUEBEC PINE, CONSTRUCTED IN THREE THICKNESSES.

Particulars
OF
EXPERIMENTAL FIRE TESTS.

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LONDON, 1900.

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Two Shillings and Sixpence.

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No. 31—OFFICIAL FIRE TESTS WITH GLASS (No. 11).
No. 32.—OFFICIAL FIRE TESTS WITH GLASS (No. 12).
No. 33.—EXPERIMENTAL PLAIN GLASS TESTS (O, P AND Q).
No. 34.—EXPERIMENTAL FIRE TESTS WITH FLOORS (R).
No. 35.—EXPERIMENTAL FIRE TESTS WITH DOORS (S AND T).
No. 36.—OFFICIAL FIRE TESTS WITH TREATED WOOD (No. 9).

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OBJECTS OF THE COMMITTEE:

The main objects of the Committee are :—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts, and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account to be read as expressions of opinion, criticisms, or comparisons.

NOTE.

So much has been said regarding the advantages of doors constructed in three thicknesses of boarding that the Executive of this Committee decided to collect some data regarding their resistance. A series of such tests with such doors, constructed on different lines, of different materials, and hung in different ways, has now been commenced, and the present report is the first to be issued on this special subject.

Attention is called to the fact that the present report deals with doors which have not been hung in frames, but have been attached directly to the brickwork, so as to close into rebates.

Nails were used in the construction of these doors, and strap hinge was employed.

The materials in this case were deal and pine.

EDWIN O. SACHS.

LONDON,
April 24th, 1900.

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically, or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges, but these charges are so figured as to only just cover the actual cost. Any surplus is refunded. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman.*

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EXPERIMENTAL FIRE TESTS,

CONDUCTED BY THE EXECUTIVE

OF THE

British Fire Prevention Committee.

[FOUNDED 1897.—INCORPORATED 1899.]

FIRE TEST BA & CA.—FEBRUARY 7TH, 1900.

(Ba) A 2⅝ in. Door of Archangel Deal, constructed in Three Thicknesses.

(Ca) A 2⅝ in. Door of Quebec Pine, constructed in Three Thicknesses.

OBJECT OF TEST.

To record the effect of a fierce fire of one hour, gradually increasing to a temperature of 2,000° Fahr.

Note.—The fire was to be applied from one side and the doors were to open inwards on to the fire side.

Note.—The door-openings were to be approximately 3 ft. 3 in. by 6 ft. 9 in.

THE GENERAL ARRANGEMENTS FOR TESTS.

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For the Executive,

EDWIN O. SACHS, *Chairman.*

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The fuel used was gas produced at the station, and the supply was regulated by valves and dampers,

The gas was admitted through two mixing chambers of fire-brick, as shown.

Two Roberts-Austen pyrometers were used for recording temperatures, to take four observation records from points Nos. 1, 2, 3 and 4, points Nos. 2 and 3 being outside the doors, and the others on the fire side of the doors. A continuous record was also taken from point No. 5.

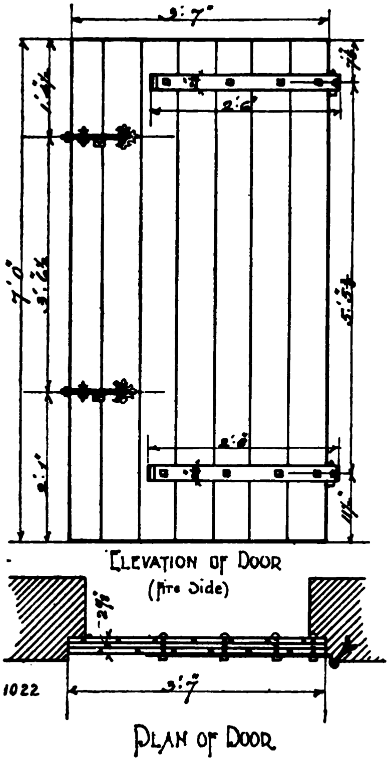


Fig. E. Detail of Doors.

There were observation holes in the east and west walls closed by moveable iron shutters.

The draught holes were in the east and west walls.

A brick wall, 14 in. thick, with two openings 3 ft. 3 in. wide, 6 ft. 9 in. high, was built across the hut, running from east to west. It was built 13 in. back from the main wall, the wall was carried up to the ceiling, the height between the floor and the ceiling being 9 ft. 6 in. The two openings were arched over with brick arches in two half brick rings, and one course of bricks were put in below the arch resting on a T iron built into the wall at both ends. The wall was built with gauged stuff.

The photographs were taken partly by daylight and partly by flashlight.

CONSTRUCTION OF THE DOORS.

(*See Figs.* E, G.)

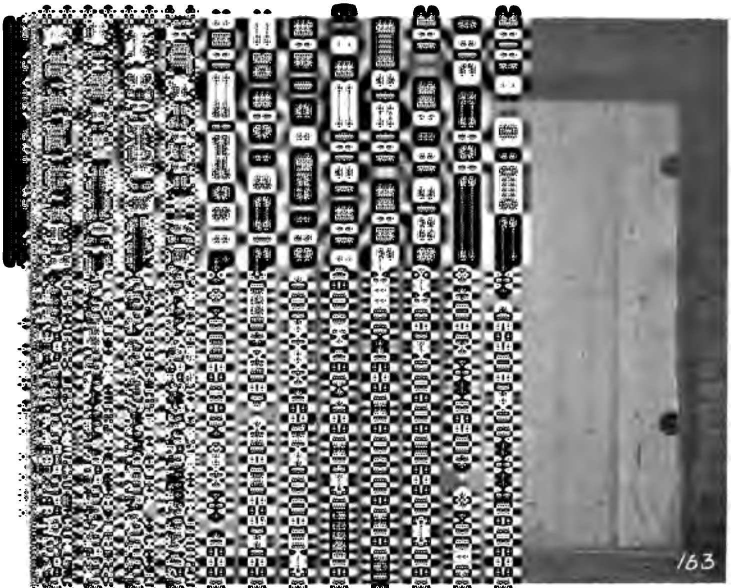
On February 6th the doors were put into position. The door on the east side was of Canadian yellow pine from Quebec, and that on the west side of yellow deal from Archangel.

The doors were 7 ft. high by 3 ft. 7 ins. wide; they were constructed of three thicknesses of ⅞ in. boards, the middle thickness being horizontal and the outer ones being vertical. All were tongued and grooved on the solid and nailed with 3 in. clasp nails clinched on the outside. The total thickness of the doors was 2⅝ ins.

Each door had wrought iron strap hinges, one near the top and one near the bottom, 2 ft. 6 ins. long, 2¼ ins. wide and ⅜ in. thick, bolted through the door with four ⅜ in. iron bolts. The hinges turned on wrought iron pins, the ends of which were built into the walls. On each door were fixed two wrought iron latches, one near the top and one near the bottom, with wrought iron catches built into the walls.

The doors were hung in brick rebates and before they [illegible] e screeded with [illegible]

[illegible] screeds, and the [illegible] ork was pointed [illegible] st.



[illegible] BEFORE THE TEST.

[illegible]

[illegible] N.)

[illegible] ndertaken. [illegible]

[illegible] vations taken at [illegible] ead as follows:— [illegible] Barometer, 29·69 [illegible] Dry bulb, 36·7° [illegible] s, fine afternoon.

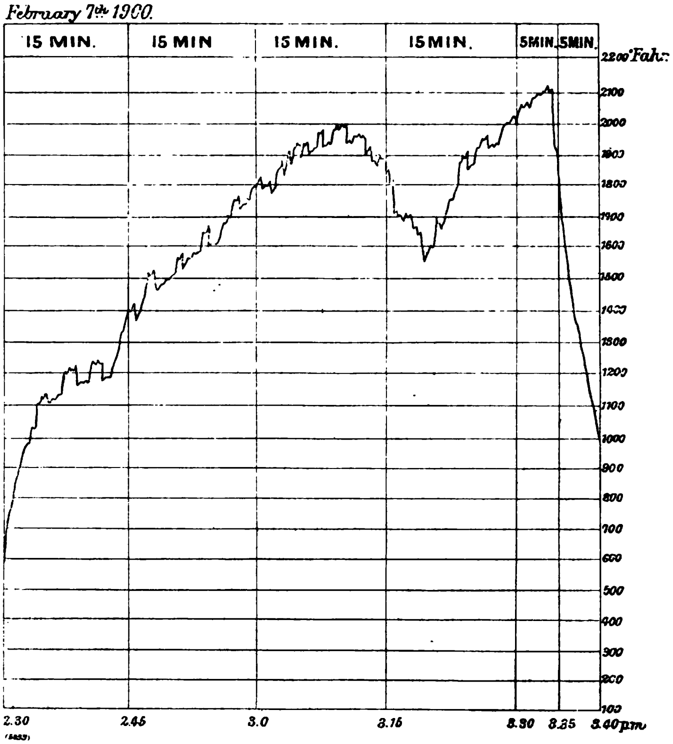
The following temperature observations were taken during the test from points Nos. 1, 2, 3 and 4, and the diagram below shows the continuous record from Point No. 5.

OBSERVATIONS TAKEN AT POINTS 1, 2, 3, 4.

From 2.30 p.m. to 3.35 p.m.

	INSIDE.		OUTSIDE.	
TIME.	No. 1. Fahr.	No. 4. Fahr.	No. 2. Fahr.	No. 3. Fahr.
2.30 p.m.	250°	300°	—	—
2.33 ,,	760°	900°	—	—
2.36 ,,	1,050°	1,150°	—	—
2.39 ,,	1,175°	1,210°	—	—
2.42 ,,	1,200°	1,240°	—	—
2.45 ,,	1,275°	1,350°	—	—
2.48 ,,	1.420°	1,500°	—	—
2.51 ,,	1,500°	1,560°	—	—
2.54 ,,	1,590°	1,650°	—	—
2.57 ,,	1,620°	1,780°	—	—
3.0 ,,	1,740°	1,780°	—	—
3.3 ,,	1,760°	1,820°	—	—
3.6 ,,	1,900°	1,910°	—	—
3.9 ,,	1,950°	1,940°	—	—
3.12 ,,	1,880°	1,950°	—	—
3.15 ,,	1,800°	1,925°	—	—
3.18 ,,	1,670°	1,720°	—	—
3.21 ,,	1,600°	1,600°	—	—
3.24 ,,	1,840°	1,880°	102°	213°
3.27 ,,	1,950°	1,950°	100°	345°
3.30 ,,	2,000°	2,000°	250°	550°
3.33 ,,	2,100°	2,080°	820°	800°
3.36 ,,	2,100°	2,060°	850°	960°

AUTOMATIC RECORD AT POINT NO. 5.



PINE DOOR.

Observations on the Outside.

At 2.30 p.m the gas was lighted.

At 2.32 p.m. smoke came through the joint between top of door and wall. This continued without intermission throughout the test.

DEAL DOOR.

Observations on the Outside.

At 2.30 p.m. the gas was lighted.

At 2.32 p.m. smoke came through the joint between the top of door and wall. This continued without intermission throughout the test.

PINE DOOR—*continued.*	DEAL DOOR—*continued.*
At 2.50 p.m. smoke also came out down joint between door and wall on west side, about 18 in.	At 2.50 p.m. smoke also came out down each side about 2 ft.
Signs of heat were showing around one of the heads of the bolts securing bottom hinge. There was no sign of external sweating.	Signs of heat showing around two of the heads of bolts securing bottom hinge. Door sweating very considerably on the outside.
At 2.59 p.m. bolt heads of lower hinge just visibly changing colour; two next east showed brown; one next west showed pale blue.	At 2.59 p.m. two of the heads of bolts securing the lower hinge were a full blue colour.
	At 3.7 p.m. a creaking sound was heard.
	At 3.9 p.m. flame appeared over top of door intermittingly.
At 3.10 p.m. all bolt heads were black hot, and scorching the surrounding wood. Head of bolt burnt a piece of paper when applied. Outer face of the door was dry. The joints generally were $\frac{1}{32}$ in. open.	At 3.10 p.m. All bolt heads were black hot and scorching the surrounding wood and burnt a piece of paper when applied. The outer face of the door was dry, and the joints generally were $\frac{1}{32}$ in. open.
At 3.12 p.m. all the clinched ends of the nails used in the door were scorching the boards on outside face.	At 3.12 p.m. flame appeared at west top corner, about 12 ins. at top and 12 in. at side intermittingly. Wood adjoining west bolt of bottom hinge showed fire above and below it. All the clinched ends

Pine Door—*continued.*	Deal Door—*continued.*
	of the nails used in the door were scorching the boards on the outside face.
At 3.13 p.m. smoke was coming from the scorched wood around bolts to lower hinge.	At 3.13 p.m. smoke came from the scorched wood around bolts to lower hinge.
	At 3.18 p.m. the fire around west bolt, lower hinge, had burnt the hole upwards and downwards, and this hole was extending.
At 3.20 p.m. no sign of flame around door, but the wood around bolts and nails much scorched.	
At 3.22 p.m. no sign of flame, but increasing scorching of the wood on outer face of door.	At 3.22 p.m. the flame was increasing along top of door and down joint on west side.
	At 3.25 p.m. flame came through joint all along top and down west side nearly half way, and also through upper portion of door west of centre. Also at bottom by west bolt and at four other small points.
At 3.30 p.m. flame came through the joint at top, down west side, and also bursting out through the upper part of door in several places. No sign of burning round bolts of lower hinge.	

PINE DOOR—*continued.*

At 3.34 p.m. the flames coming through the holes burnt in several parts of the door had greatly increased, and a number of smaller holes had been burnt through the whole thickness.

At 3.35 p.m. the gas was shut off.

At 3.37 p.m. water was applied to the outer face of door for one minute.

DEAL DOOR—*continued.*

At 3.34 p.m. the flames coming through the holes burnt in several parts of the door had greatly increased, and a number of smaller holes had been burnt through the whole thickness.

At 3.35 p.m. the gas was shut off.

At 3.37 p.m. water was applied to the outer face of door for one minute.

PINE DOOR.

Observations on Inside.

At 2.36 p.m. the face of the door was blazing freely all over, except a very small portion at the bottom on west side.

At 3.2 p.m. small pieces of the inner thickness of the door were falling off at bottom.

At 3.6 p.m. bolts and catches of latches bright red hot.

DEAL DOOR.

Observations on Inside.

At 2.36 p.m. the face of the door blazing freely all over, except a small portion at the bottom on east side.

At 3.2 p.m. pieces of the inner thickness of the door were falling off in several places.

At 3.6 p.m. bolts and catches of latches bright red hot.

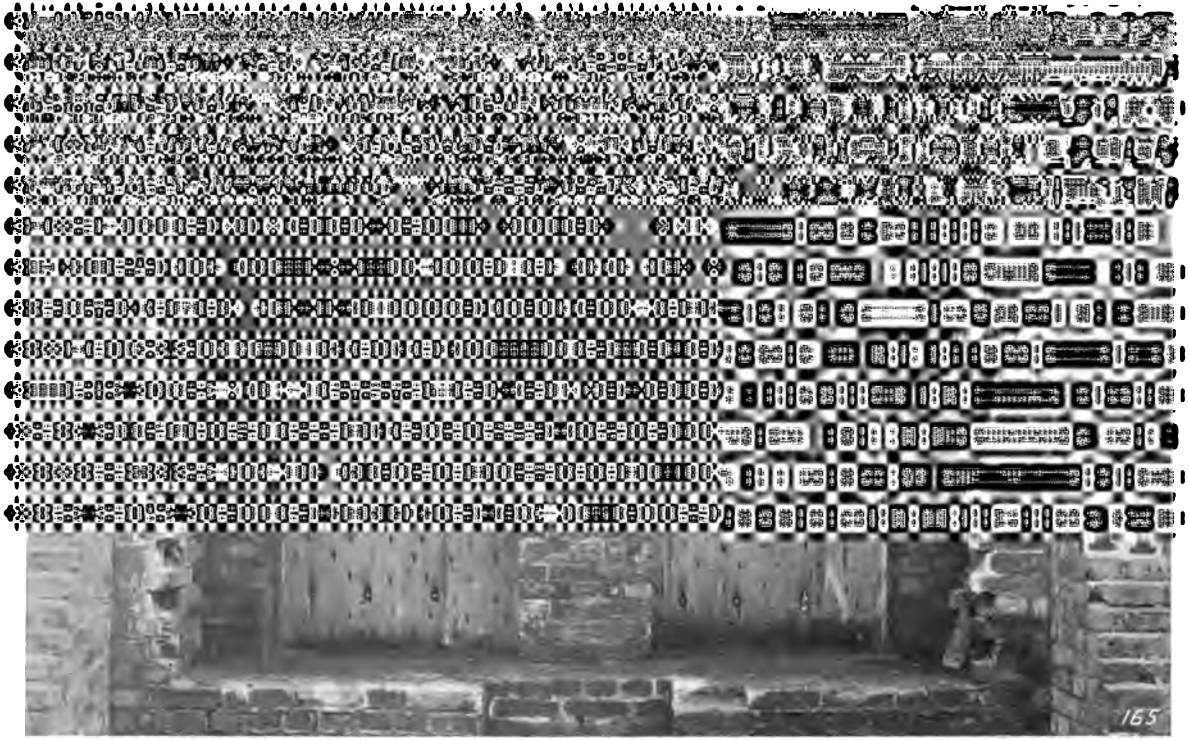


Fig. H. View Showing Condition of Doors after 55 Minutes.

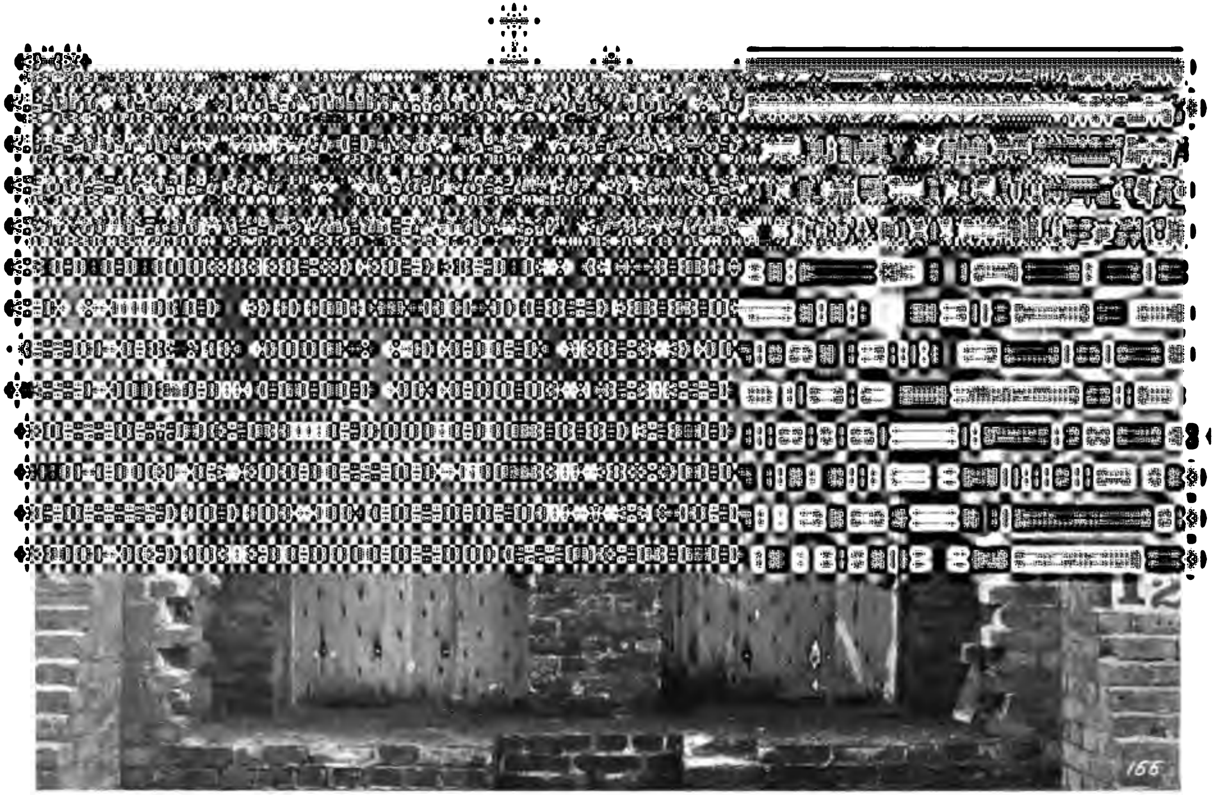


Fig. 3. View Showing Condition of Doors after 60 Minutes.

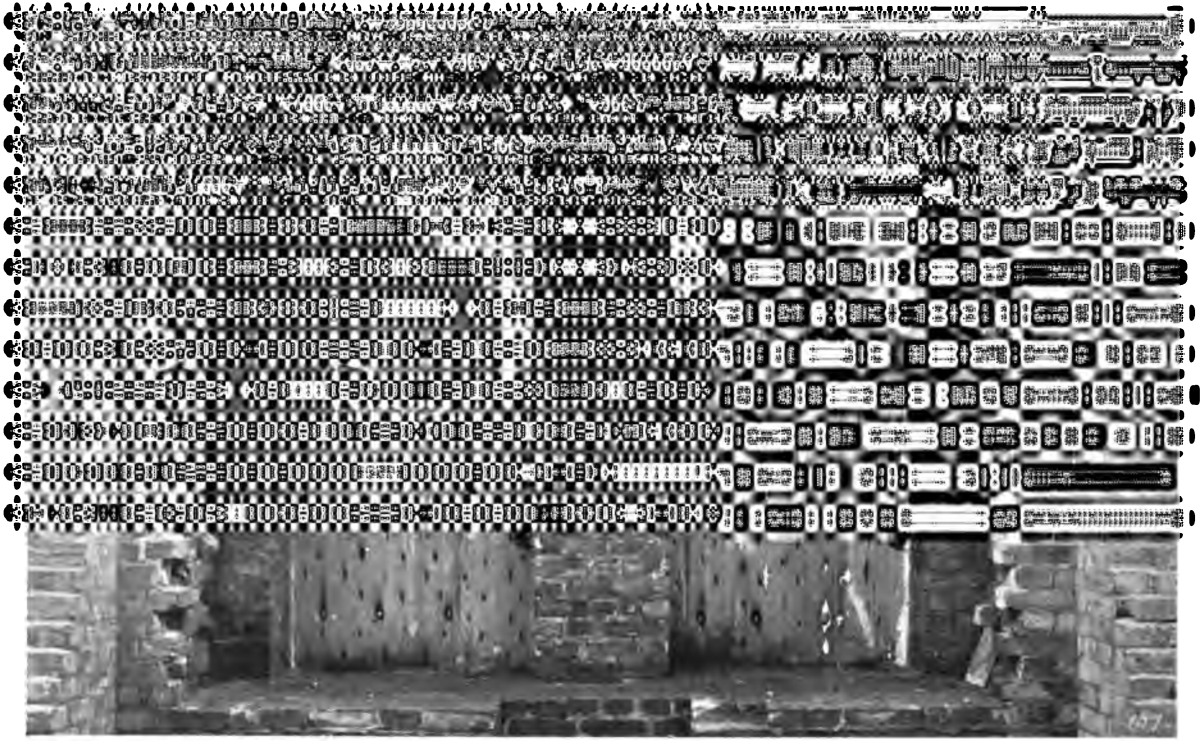


Fig. K. View Showing Condition of Doors after 63 Minutes.

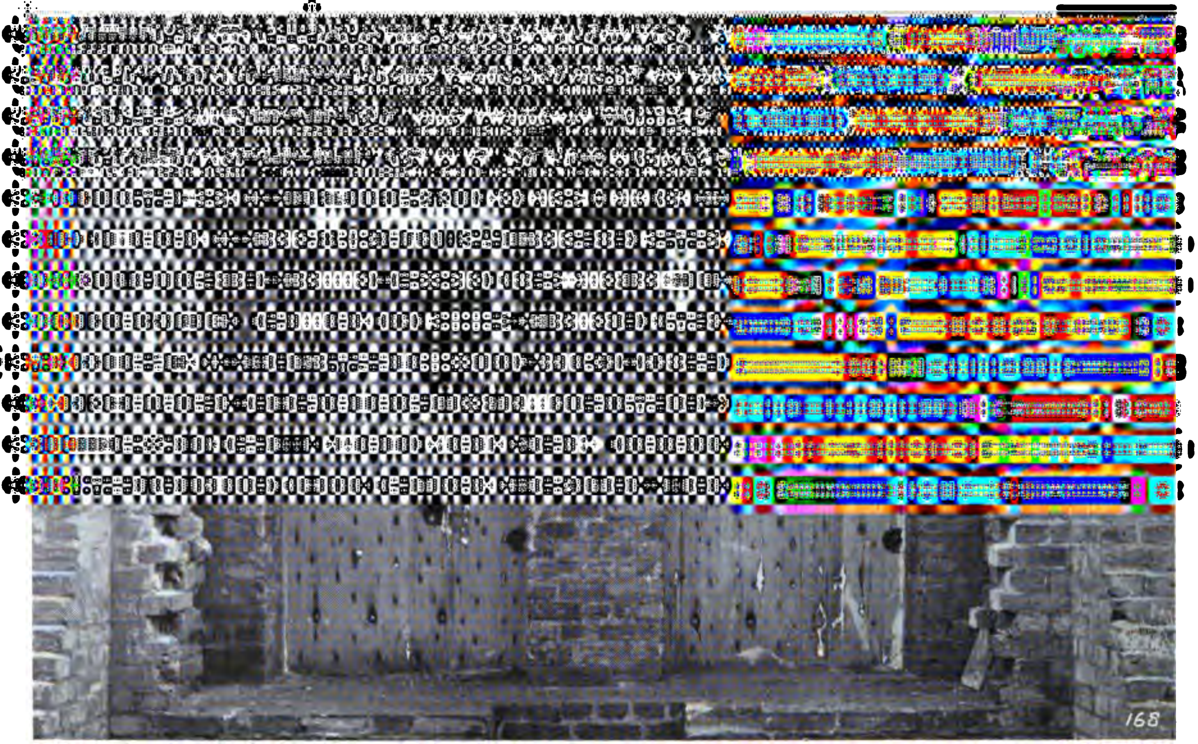


Fig. L. VIEW SHOWING CONDITION OF DOORS AFTER 65 MINUTES.

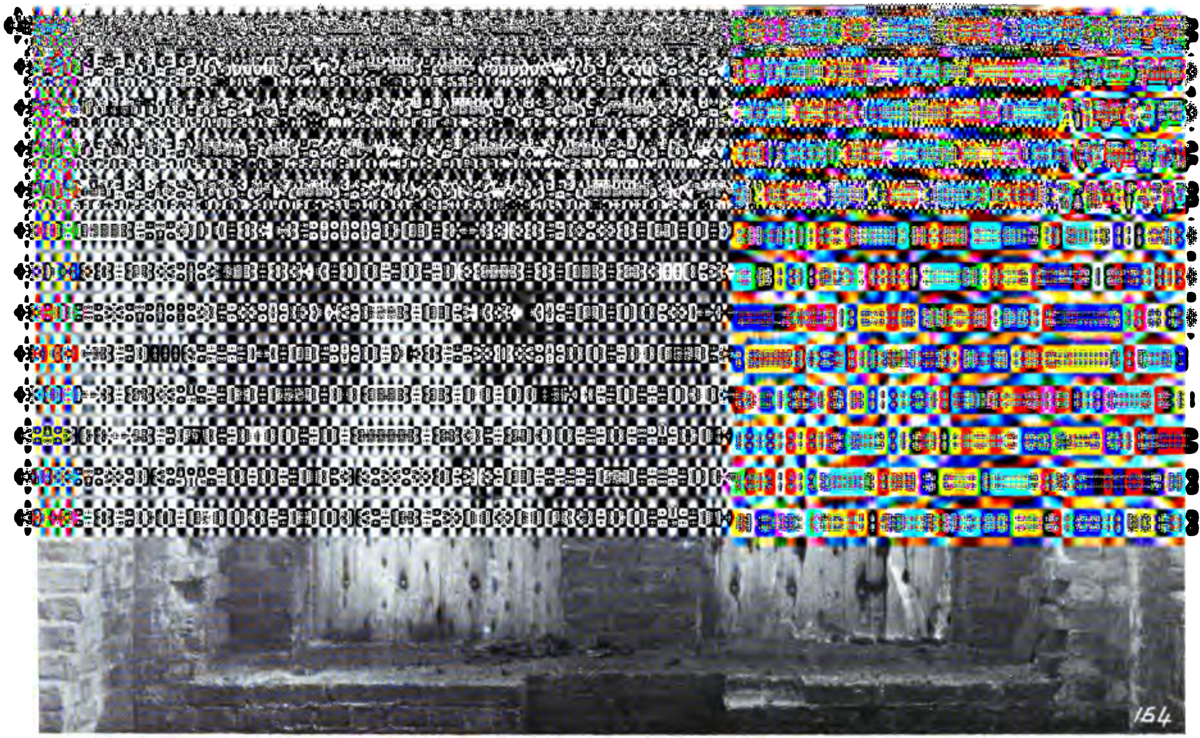


Fig. M. View Showing Condition of Doors after the Application of Water. (3.39 P.M.)

GENERAL ARRANGEMENTS.

The test was carried out in accordance with the procedure laid down by the Executive for investigations of this description, and conducted by a Sub-Committee, comprising :—

Mr. Max Clarke, A.R.I.B.A. (Directing Member).
Mr. Ellis Marsland, District Surveyor, Camberwell.
Mr. F. R. Farrow, F.R.I.B.A.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.

Mr. H. B. White, M.I.E.E., superintended the instrument room.

The Council was represented by :

Sir John Taylor, K.C.B. (H.M. Office of Works).
Mr. H. H. Collins, F.R.I.B.A., F.S.I., Past President, District Surveyors' Association.

The Executive was represented by :—

Mr. Edwin O. Sachs (Chairman).
Mr. E. Woodthorpe, M.A., F.R.I.B.A.
Mr. Chas. E. Goad, M.Am.Soc.C.E.

The Commercial Section was represented by :—

Mr. F. R. Farrow, F.R.I.B.A. (Chairman).
Mr. R. Buggé.
Lieut.-Col. J. Colquhoun. (London Non-Flammable Wood Co.)
Mr. J. F. Golding (The Expanded Metal Co.).
Mr. J. D. O'Brien (The Columbian Fireproofing Co.).
Mr. H. J. Joseph (The Abestos and Abestic Co.).
Mr. F. B. Passmore (The British Uralite Co.).
Mr. C. Petri (The Mural Decoration Syndicate).
Mr. H. B. Tarry)The British Uralite Co.).
Mr. F. Wallers (Dowson, Taylor & Co.).
Mr. G. A. Williams (Messrs. G. A. Williams & Son).

The general body of members was represented by:—

Mr. Arthur Crow, A.R.I.B.A. (District Surveyor, Whitechapel).
Mr. Bernard Dicksee, A.R.I.B.A. (District Surveyor, E. Newington).
Mr. E. Dru Drury, F.R.I.B.A., F.S.I. (District Surveyor, St. Margaret's).
Mr. W. Grellier, F.R.I.B.A. (District Surveyor, Clapham).
Mr. F. W. Hamilton, F.R.I.B.A. (District Surveyor, North Fulham).
Mr. A. J. Handford (Surveyor).
Mr. E. R. Hewitt, A.R.I.B.A. (District Surveyor, St. Saviour's).
Mr. Geo. McDonell, A.R.I.B.A. (District Surveyor, Islington).
Mr. Hugh McLachlan, A.R.I.B.A. (District Surveyor, West Division City of London).
Mr. S. F. Monier-Williams, A.R.I.B.A. (District Surveyor, South Fulham).
Mr. R. Notley, F.R.I.B.A., F.S.I. (District Surveyor, Bethnal Green).
Mr. L. E. Aulagnier (Westminster Fire Office).
Mr. A. Saxon-Snell, A.R.I.B.A.
Mr. George Tolley.

The following visitors attended by special invitation of the Executive:—

Mr. H. L. Cunnah; Mr. Matt Garbutt, A.R.I.B.A., A.M.I.C.E.; Mr. F. G. Hamilton (Royal Exchange Assurance); Mr. H. King (Royal Exchange Assurance); Mr. T. Nicholls; Mr. Geo. Pritchard; Mr. W. A. Scott.

Signed,

For the Sub-Committee conducting the Test:
MAX CLARKE (*Directing Member*).

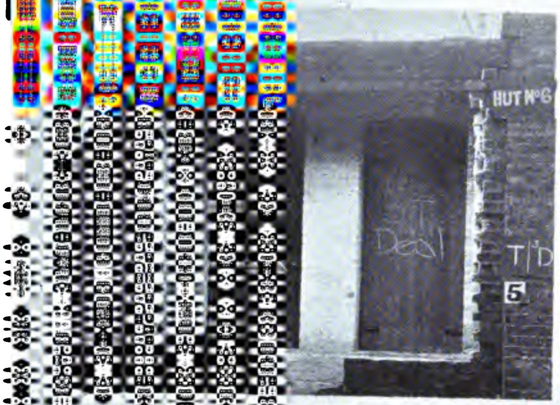
For the Commercial Section:
FREDERIC R. FARROW.

For the Executive:
EDWIN O. SACHS (*Chairman*).

Published by the Committee
as directed by the Executive.
H. S. TAYLOR
(Assist. Secretary).

Date—April 24th, 1900.

25° TIME 2.42pm



290° TIME 3.2pm

00° TIME 3.22pm

Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 50.

Edited by Edwin O. Sachs.

FIRE TESTS WITH DOORS.

(Da) A $2\frac{3}{8}$-in. DOOR OF ARCHANGEL DEAL, CONSTRUCTED IN THREE THICKNESSES.

(Ea) A $1\frac{5}{8}$-in. DOOR OF TEAK, FLUSH PANELLED ON EACH SIDE, THE PANELS BEING IN TWO THICKNESSES.

Particulars
OF
EXPERIMENTAL FIRE TESTS.

ALL RIGHTS RESERVED.

LONDON, 1900.

PUBLISHED AT THE OFFICES OF
THE BRITISH FIRE PREVENTION COMMITTEE
(Founded, 1897—Incorporated, 1899),
1, WATERLOO PLACE, PALL MALL.

Two Shillings and Sixpence.

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OF THE

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No. 12.—THE EFFECT OF FIRE.
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No. 25.—EXPERIMENTAL FIRE TESTS WITH DOORS (K AND L).
No. 26.—EXPERIMENTAL FIRE TESTS WITH DOORS (M AND N).
No. 27.—OFFICIAL FIRE TEST WITH PARTITIONS (No. 7).
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No. 35.—EXPERIMENTAL FIRE TESTS WITH DOORS (S AND T).
No. 36.—OFFICIAL FIRE TESTS WITH TREATED WOOD (No. 9).

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OBJECTS OF THE COMMITTEE.

The main objects of the Committee are :—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts, and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account intended to read as expressions of opinion, criticisms, or comparisons.

NOTE.

The report presented in this publication again shows the results obtained in two door tests. The teak door used in this case had been condemned by a district surveyor as not complying with the Building Act, the panels being constructed in two thicknesses and the total thickness being insufficient.

The deal door was one that was specially constructed for the purposes of this test and was in three thicknesses, the thicknesses being held together by deal pins.

This publication should be read together with the reports on other door tests, particularly in this case with the door tests with three thickness doors held together with clasp nails (Publication No. 49).

EDWIN O. SACHS.

October 1st, 1900.

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically, or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurrences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges. Any surplus is refunded. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman.*

EXPERIMENTAL FIRE TESTS

CONDUCTED BY THE EXECUTIVE

OF THE

British Fire Prevention Committee.

[FOUNDED 1897.—INCORPORATED 1899.]

FIRE TEST Da, Ea.—MARCH 28TH, 1900.

(Da) A $2\frac{3}{8}$-in. Door of Archangel Deal, constructed in three thicknesses.

(Ea) A $1\frac{5}{8}$-in. Door of Teak, flush panelled on each side, the panels being in two thicknesses.

OBJECT OF TEST.

To record the effect of a fierce fire of one hour, gradually increasing to a temperature of 2,000° Fahr.

Note.—The fire was to be applied from one side, and the doors were to open inwards on to the fire side.

Note.—The door-openings were to be approximately 3 ft. by 7 ft.

SUMMARY OF EFFECT.

DEAL DOOR.

In 53 minutes flame appeared on the outside through the vertical joint between boards in centre of door just above the sill.

In 66 minutes a hole about 6 inches square was burnt through door in centre just above sill, and also a small hole level with top bolt in second joint from east side, there was no other sign of damage on the outside.

At the conclusion of the test the door remained in position.

After conclusion of the test it was seen that the two inner thicknesses were practically gone.

TEAK DOOR.

In 16 minutes flame appeared over the top of door.

In 53 minutes the whole of the top rail of door was burning, and flame also appeared between joints of lower panels and muntin.

In 58 minutes the west portion of top rail fell.

In 65 minutes the greater part of the door fell, leaving the east style, a portion of the west style and the bottom rail in position, but much burnt.

Note.—The duration of the test was 71 minutes, or 11 minutes beyond the hour defined in the "Object of Test."

DESCRIPTION OF THE TESTING PLANT.

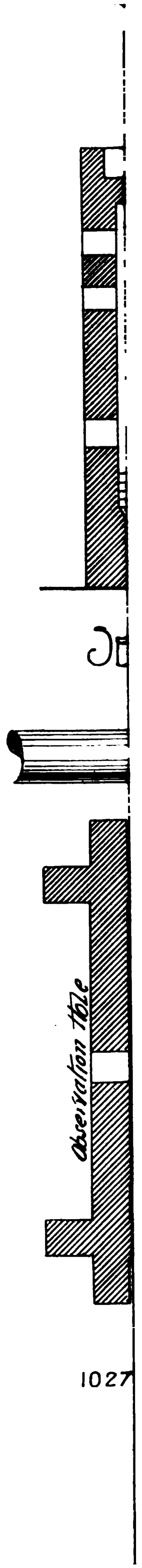
(*See Figs.* A, B, C *and* D.)

The Testing Chamber used was located at the Committee's Testing Station, and was known as No. 6 Hut.

The hut was constructed, as shown, of stock bricks with lime mortar, and measured 10 ft. by 10 ft. internally.

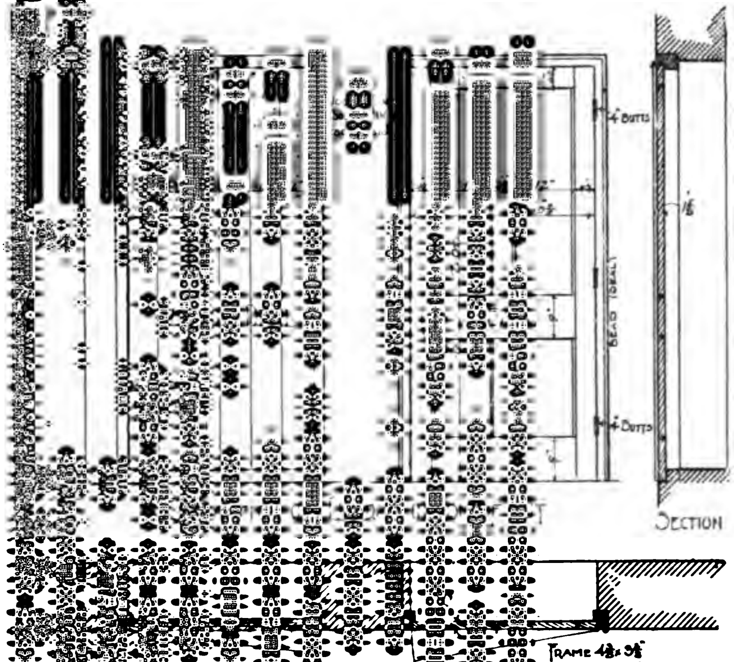
The ceiling of the hut was 9 ft. 6 in. above the pavement of the chamber, and was formed of solid wood beams grouted with fire-clay. The chamber in which the fire was measured 10 ft. by 7 ft. 10 in.

The fuel used was gas produced at the station, and the supply was regulated by valves and dampers.


Observation Hole
1027

[illegible] mixing chambers [illegible]

[illegible] used for record- [illegible] in records from [illegible] 2 and 3 being [illegible] fire side of the [illegible] taken from point [illegible]



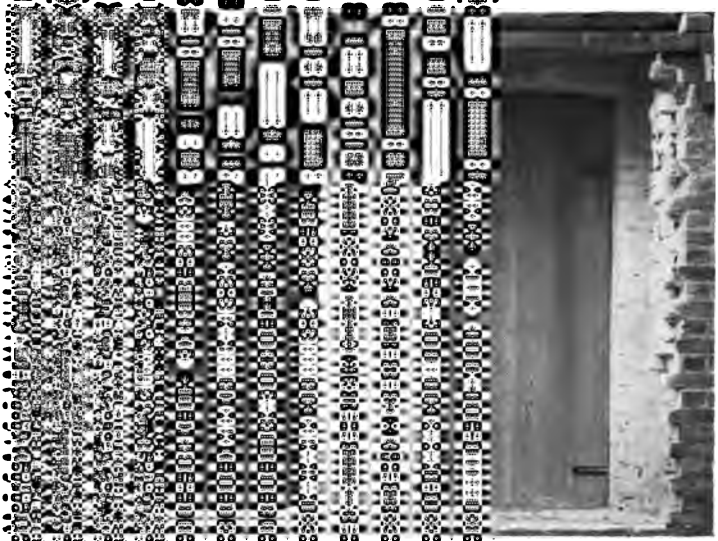
[illegible]

[illegible] east and west [illegible]

[illegible] west walls. [illegible] by daylight and [illegible]

[illegible] openings 3 ft. 3 in. [illegible] the hut, running [illegible] in. back from the [illegible] to the ceiling, the [illegible] ng being 9 ft. 6 in. [illegible] ith brick arches in [illegible] built with gauged

[illegible] EAL.



[illegible] (FROM OUTSIDE).

[illegible] DOORS.

[illegible] put into position. [illegible], and that on the [illegible] rchangel.

[illegible]

[illegible] by 6 ft. 9⅜ in high, [illegible] knesses of boards, [illegible] al, and the outer ones vertical. The boards were butt jointed; they were secured together with ⅜ in. deal double wedge-shaped pins, driven in from both sides, about fifty to each board. The top and sides of door were splayed to fit the splayed rebate on frame.

The door was hung on two wrot iron cross garnet hinges, the door was fastened with four 6-in. iron neck barrel bolts to a frame of oak, 4⅜ in. by 3 in., with a splayed rebate, the screws to secure the bolts being 1¼ in. long and only driven into the outer thickness. The frame was secured to the brickwork by spikes driven into deal plugs inserted in the joints of the brickwork.

TEAK DOOR.

The teak door was 3 ft. 0⅞ in. wide by 7 ft. 0½ in. high, 1⅝ in. thick, four panel, bead butt both sides, the panels being flush each side, the panels being in two thicknesses.

The styles and top rail were 4¼ in. wide; the centre and bottom rails were 9 in. wide. The panels were tongued into the styles and rails. The door was hung with three 4-in. wrot iron butt hinges and secured with a 5-in. mortice lock and brass furniture, to a teak frame 4⅜ in. by 3⅜ in., with a ½ in. rebate. The frame was secured to the brickwork by spikes driven into deal plugs inserted in the joints of the brickwork.

The frames were pointed all round with mortar.

THE TEST.

(*See Figs.* 1 *to* 12, E *to* L).

On March 28th, 1900, the test was undertaken.

The following is a log of the test:—

At 3 p.m. the meteorological observations taken at the Botanic Gardens, Regent's Park, read as follows:—State of weather, overcast; Rain, none; Wind, N.N.E.; Barometer, 29·54 in.; Attached Thermometer, 43° Fahr.; Dry Bulb, 39·2° Fahr.; Wet Bulb, 36·8° Fahr.; Remarks, dull afternoon, cold, hazy.

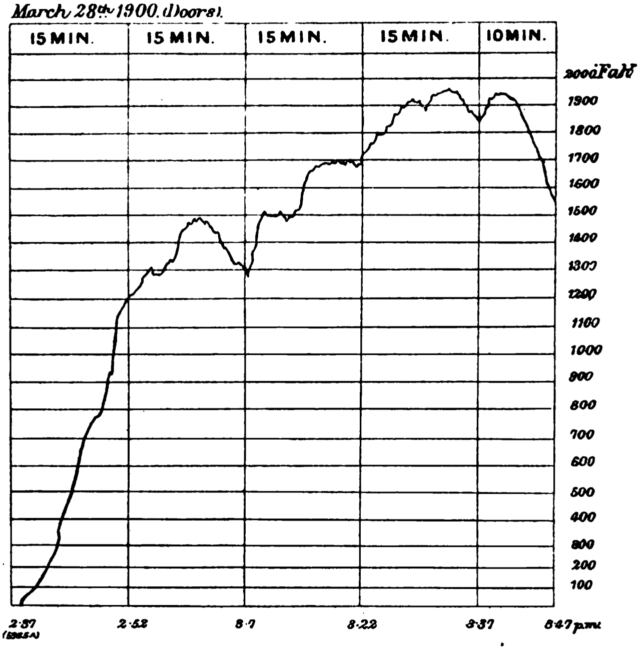
The following temperature observations were taken during the test from points Nos. 1, 2, 3 and 4, and the diagram on next page shows the continuous record from point No. 5.

OBSERVATIONS TAKEN AT POINTS NOS. 1, 2, 3 & 4.

From 2.39 *p.m. to* 3.48 *p.m.*

	INSIDE.		OUTSIDE.	
TIME.	No. 1. Fahr.	No. 4. Fahr.	No. 2. Fahr.	No. 3. Fahr.
2.39 p.m.	300°	110°	—	—
2.42 "	100°	150°	—	—
2.45 "	500°	875°	—	—
2.48 "	1,100°	1,200°	—	—
2.51 "	1,200°	1,300°	—	—
2.54 "	1,200°	1,300°	—	—
2.57 "	1,350°	1,410°	—	—
3.0 "	1,350°	1,440°	103°	—
3.3 "	1,240°	1,340°	105°	—
3.6 "	1,302°	1,460°	103°	—
3.9 "	1,390°	1,490°	150°	—
3.12 "	1,460°	1,610°	200°	—
3.15 "	1,580°	1,675°	275°	—
3.18 "	1,550°	1,630°	345°	—
3.21 "	1,625°	1,740°	380°	—
3.24 "	1,700°	1,820°	550°	—
3.27 "	1,780°	1,860°	730°	—
3.30 "	1,850°	1,900°	890°	—
3.33 "	1,800°	1,850°	1,080°	—
3.36 "	1,750°	1,800°	1,060°	—
3.39 "	1,800°	1,860°	1,410°	—
3.42 "	1,700°	1,750°	1,300°	—
3.45 "	1,490°	1,550°	1,160°	105°
3.48 "	1,400°	1,450°	1,050°	100°

AUTOMATIC RECORD AT POINT NO. 5.



DEAL DOOR.	TEAK DOOR.
Observations on the Outside.	*Observations on the Outside.*
At 2.37 p.m. the gas was lighted. (See Fig. G.)	At 2.37 p.m. the gas was lighted. (See Fig. G.)
	At 2.39 p.m. smoke came through the joint between top of door and frame.

Deal Door—*continued.*	Teak Door—*continued.*
At 2.44 p.m. smoke came through the joint between top of door and frame at west corner and for about 12 inches down west side.	
	At 2.53 p.m. flame appeared intermittingly over top of door at west corner.
	At 2.55 p.m. flame appeared all along the top of door.
	At 3.0 p.m. the top of door was twisted inwards ¾ in. at west side and ¼ in. at east side.
	At 3.0 p.m. flame appeared about 15 in. down west side of door from top.
	At 3.24 p.m. flame appeared through keyhole, and through the wood around lock, the flame over door increasing, top rail being much burnt.
	At 3.26 p.m. door bulging outwards in centre, about middle of upper panels.

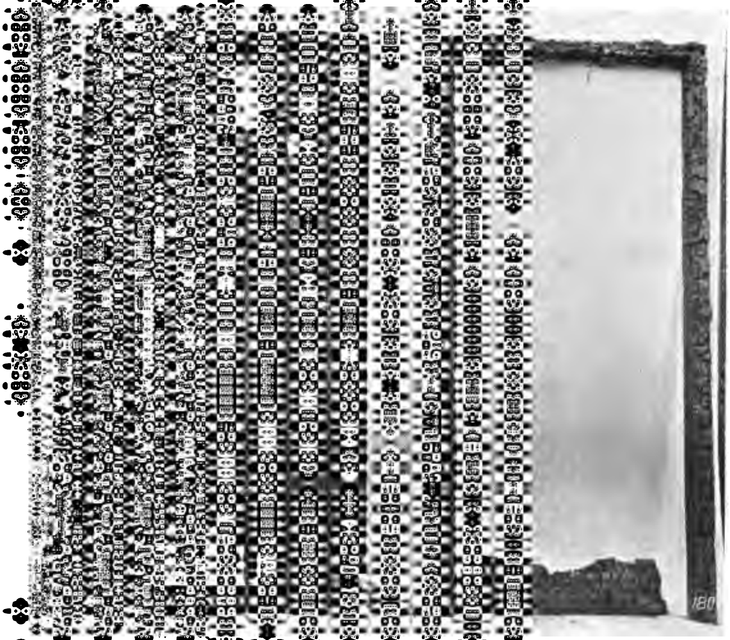
Deal Door—*continued.*	Teak Door—*continued.*
At 3.30 p.m. first appearance of flame through the joint between boards in centre of door above sill, about 2 in. long.	At 3.30 p.m. the whole of the top rail of door was burning and flame beginning to extend down style and panel on the west side. Flame also appeared between east lower panel and muntin at bottom.
At 3.35 p.m. flame appeared through centre board at bottom where one of the pins had been burnt through. (See Fig. I.)	At 3.35 p.m. flame appeared between joints on both sides of west lower panel and on west side of east lower panel; whole height of panel, west portion of top rail fallen in. (See Fig. I.)
At 3.42 p.m. a hole about 6 in. square was burnt through the door in centre above sill, and also a small hole level with top bolt in second joint from east side, but there was no other sign of damage on the outside. (See Fig. L.)	At 3.42 p.m. the greater part of the door fell, leaving the east style, a portion of the west style and the bottom rail in position, but much burnt. (See Fig. L.)
At 3.48 p.m. the gas was shut off.	At 3.48 p.m. the gas was shut off.
At 3.49 p.m. water was applied to the outer face of door for two minutes.	

DOOR—*continued.*

...ns on the Inside.

...p.m. the face of ...menced to blaze

TEAK.



...SIDE AFTER REMOVAL.

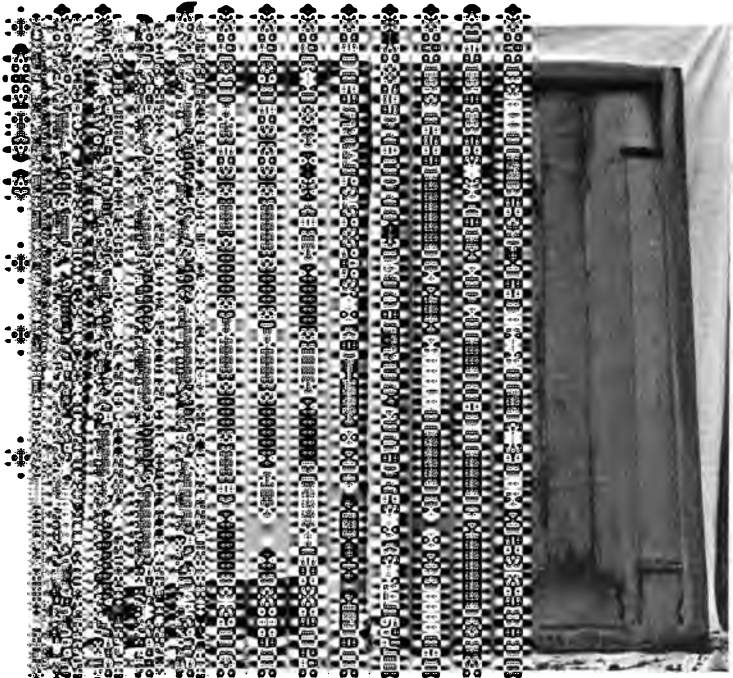
[illegible] TEST.

[illegible] K DOOR.

[illegible] les which re- [illegible] when remainder [illegible] ll were badly [illegible] ll shortly after. [illegible] rail was also [illegible] t. (See Figs.

[illegible] oved and photo- [illegible] en.

[illegible] DEAL.



[illegible] TSIDE AFTER REMOVAL.

GENERAL ARRANGEMENTS.

The test was carried out according to the procedure laid down by the Executive for investigations of this kind, and conducted by a Sub-Committee of the Executive, comprising :—

Mr. Max Clarke, A.R.I.B.A.
Mr. Ellis Marsland, District Surveyor, Camberwell.
Mr. Matt Garbutt, A.M.Inst.C.E.

Mr. Thomas Kissack (Resident Engineer at the Testing Station) assisted the Sub-Committee.

Mr. H. B. White, M.I.E.E., superintended the Instrument Room.

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Sir John Taylor, K.C.B. (H.M. Office of Works).
Mr. Arthur Cates, F.R.I.B.A. (late Surveyor, Crown Estates).

The Executive was represented by :—

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Mr. Chas. E. Goad, M.Am.Soc.C.E.
Mr. F. Hammond, F.R.I.B.A., District Surveyor, East Hampstead.

The Members' Testing Sub-Committee was represented by :—

Mr. George E. Monckton, M.A.

The general body of members was represented by :—

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Mr. Arthur Crow, F.R.I.B.A., District Surveyor, Whitechapel.
Mr. Bernard Dicksee, A.R.I B.A., District Surveyor, E. Newington.
Mr. E. Dru-Drury, F.R.I.B.A., District Surveyor, St. Margaret's.

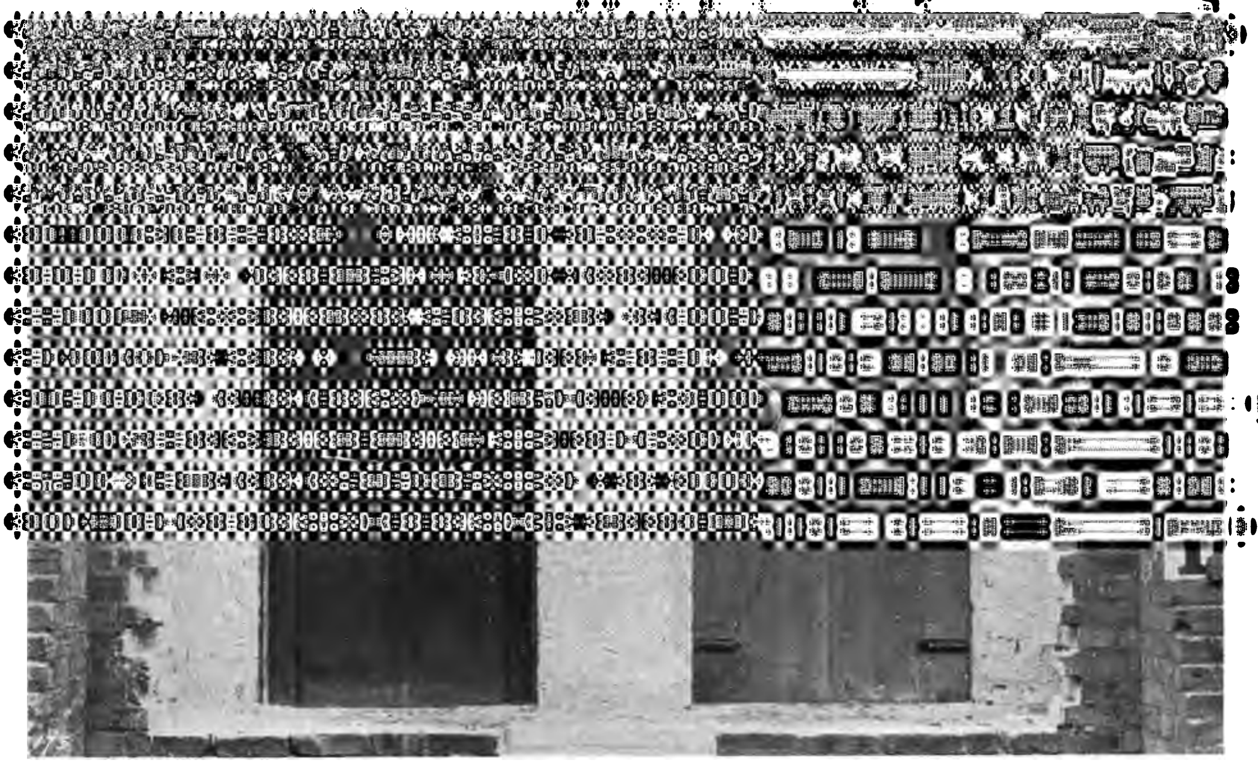

Fig. 11. View of Doors showing Condition after 50 Minutes.

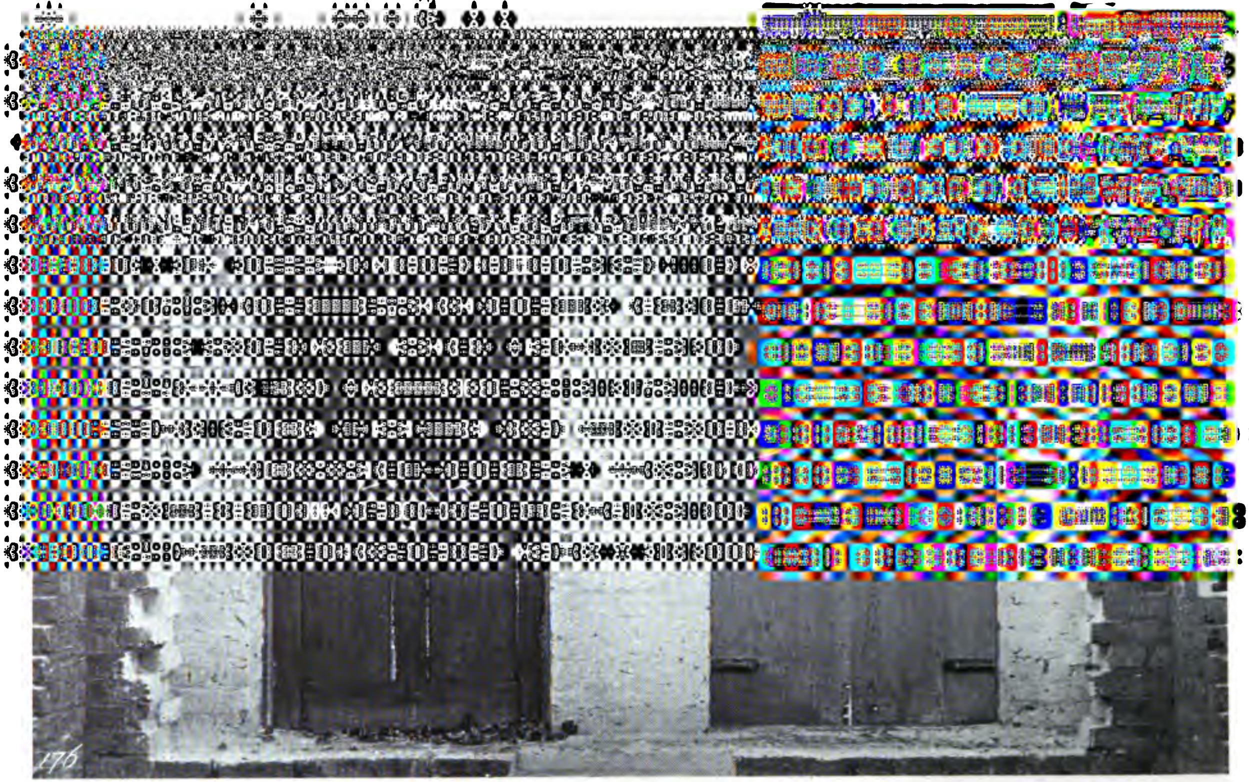

Fig. 1. VIEW OF DOORS SHOWING CONDITION AFTER 60 MINUTES.

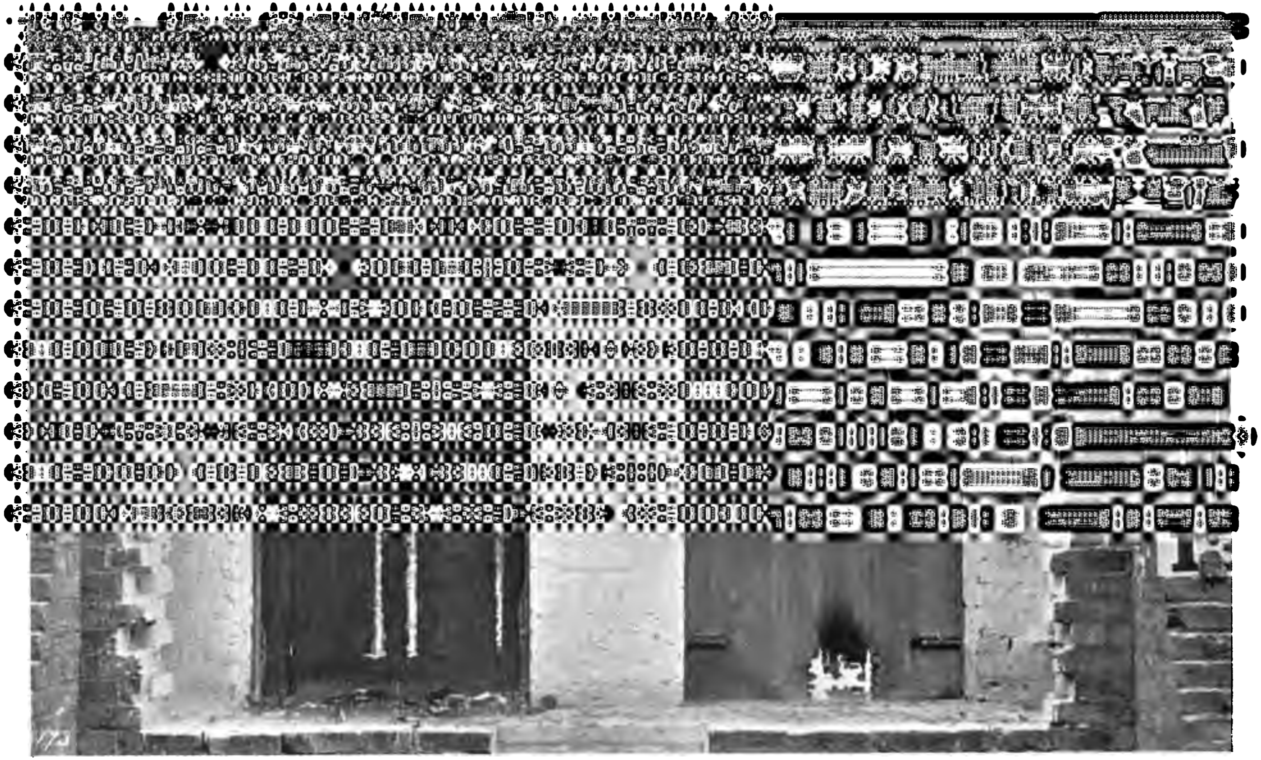

Fig. K. VIEW OF DOORS SHOWING CONDITION AFTER 63 MINUTES.

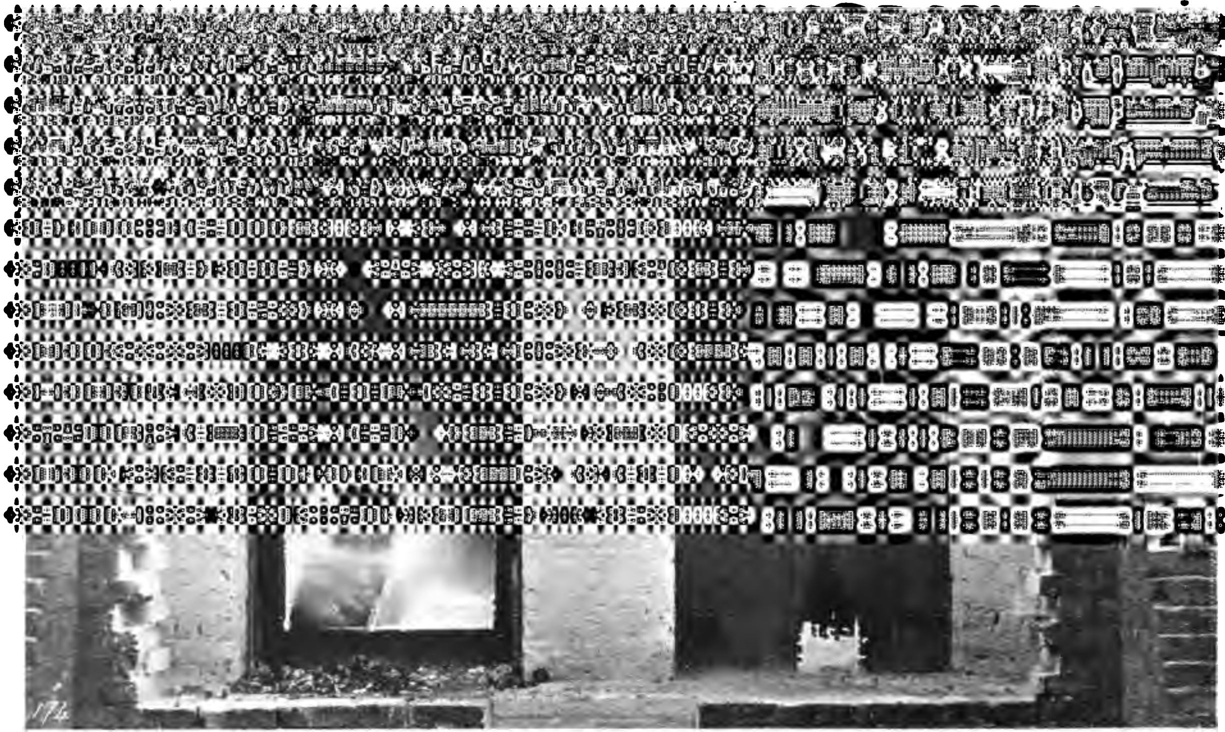

Fig. L. VIEW OF DOORS SHOWING CONDITION AFTER 65 MINUTES.

Mr. J. H. Dyer, Vice-President, National Fire Brigade Union.
Mr. F. E. Eiloart.
Mr. A. Fearnhead.
Mr. W. Grellier, F.R.I.B.A., District Surveyor, Clapham.
Mr. F. W. Hamilton, A.R.I.B.A., District Surveyor, North Fulham.
Mr. E. R. Hewitt, A.R.I.B.A., District Surveyor, Southwark.
Mr. George McDonell, A.R.I.B.A., District Surveyor, Islington.
Mr. H. McLachlan, A.R.I.B.A., District Surveyor, Western Division, City of London.
Mr. J. P. Norrington, A.M.Inst.C.E., Surveyor, Lambeth.
Mr. R. F. P. Notley, F.R.I.B.A., F.S.I., District Surveyor, Bethnal Green.
Mr. W. Weaver, M.Inst.C.E., Surveyor to the Vestry of St. Mary Abbots, Kensington.

The Commercial Section was represented by :—

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Mr. Gilbert Davenport (The Expanded Metal Co.).
Mr. J. A. King (Messrs. J. A King & Co.).
Mr. J. D. O'Brien (The Columbian Fireproofing Co.).
Mr. H. Salmon (The Expanded Metal Co.).
Mr. H. Brome Tarry (The British Uralite Co.).
Mr. J. F. Golding (The Expanded Metal Co.).
Mr. D. R. Radcliff (The Ratner Safe Co.).
Mr. Alfred Williams (Messrs. G. A. Williams & Son).

The following visitors attended by special invitation of the Executive:—

Mr. A. Howard Colls.
Mr. T. Costigan (Sec. Builders' Institute).
Mr. Coward.

Mr. Howard Dru Drury.
Mr. R. J. Friswell.
Mr. T. E. Gatehouse, F.R.S.Ed.
Mr. A. E. Buthrey.
Mr. H. E. Hamsley.
Mr. E. R. Marsland.
Mr. W. G. Perkins.
Mr. Harry Rogers.
Mr. E. S. Young.

Signed,

For the Sub-Committee conducting the Test:
MAX CLARKE (*Directing Member*).

For the Commercial Section:
FREDERIC R. FARROW.

For the Executive:
EDWIN O. SACHS (*Chairman*).

Published by the Committee as directed by the Executive.

H. S TAYLOR
(*Asst. Secretary*).

Date—October 1st, 1900.

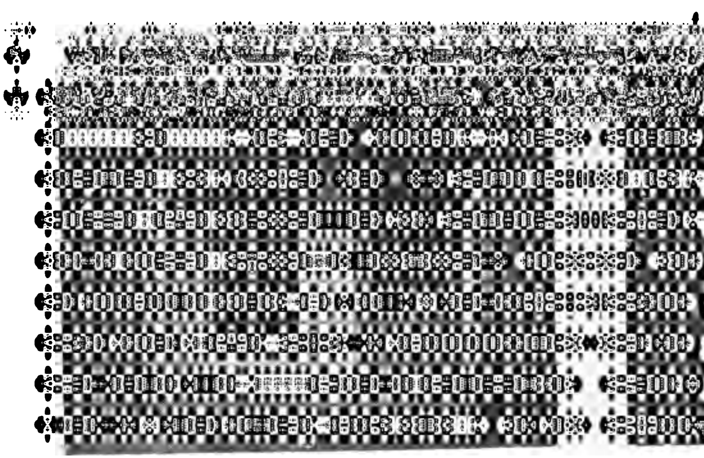

FIG. 1. TIME 3.5. AFTER 5 MINS. TEMP. 1050°

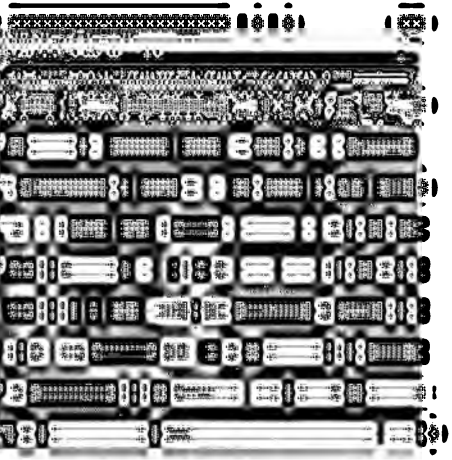

FIG. 2. TIME 3.10 AFTER 10 MINS. TEMP. 1260°

FIG. 5. TIME 3.25. AFTER 25 MINS. TEMP. 1450°

FIG. 6. TIME 3.30. AFTER 30 MINS. TEMP. 1550°

VIEW OF THE WINDOW AND DOOR, PROTECTED BY THE FIRE BLINDS. *Figs.* 1 *to* 6.

Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 51.

Edited by Edwin O. Sachs.

FIRE TESTS
WITH
FIRE-RESISTING CURTAINS
AND
BLINDS.

TWO FIRE BLINDS
KNOWN AS THE
"WILLIAMS" FIRE BLINDS,
INSTALLED BY

G. A. WILLIAMS & SON,
BAYSWATER, LONDON.

The Committee's Report.

ALL RIGHTS RESERVED.

LONDON, 1900.

PUBLISHED AT THE OFFICES OF
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OF THE

BRITISH FIRE PREVENTION COMMITTEE.

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29. FIRE TESTS with GLASS. Three Casements glazed by the British Luxfer Prism Syndicate, Ltd.
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34. FIRE TESTS with FLOORS. A Floor of Steel Joists with Coke Breeze Concrete.
35. FIRE TESTS with DOORS. A 2-in. Framed Pitch Pine Door with 2-in. Solid Panels; a 2-in. Framed Deal Door with 2-in. Solid Panels.
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OBJECTS OF THE COMMITTEE.

The main objects of the Committee are:—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account intended to read as expressions of opinion, criticisms, or comparisons.

NOTE.

As remarked on an earlier occasion, the question of protecting door and window openings by the application of some form of blind is a matter of importance to those who have premises overlooking narrow thoroughfares, or share light and air from mutual areas with adjoining owners. Nowhere was the absence of such fire blinds more felt than in our Metropolis on the occasion of the great Cripplegate fire.

The Report herewith presented deals with a form of fire blind intended primarily for the protection of windows which face dangerous property, and the test was mainly to demonstrate that an ordinary window, which would very rapidly succumb to heat if unprotected, can be guarded for a time even against high temperatures and the occasional impingement of flame. It is a question of gaining time for the fire brigade that is of such great importance, and bearing this in mind, the present contribution to the Committee's records should be of considerable value.

EDWIN O. SACHS.

LONDON,
November 10*th*, 1900.

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurrences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman.*

THE BLINDS. *Fig.* 13. VIEW AFTER OPENING WINDOW AND DOOR, 15 MINUTES AFTER CONCLUSION OF TEST.

OFFICIAL REPORTS
OF THE
British Fire Prevention Committee.
[FOUNDED 1897—INCORPORATED 1899]

FIRE TESTS NOS. 25, 26.—MAY 23RD, 1900.

TWO FIRE BLINDS,
KNOWN AS
THE "WILLIAMS" FIRE BLINDS,
INSTALLED BY
G. A. WILLIAMS & SON,
BAYSWATER, LONDON.

OBJECT OF TEST.

To record the protection against fire afforded respectively to a window and to a door, when screened from the flames by rolling fire blinds which can be put into position in a few seconds; the fire to have a temperature gradually increasing from 400° to 1600° and to endure for 30 minutes.

Note.—The area of protected door to be about 20 superficial feet and that of the window to be about 16 superficial feet.

Note.—The seat of the fire to be within three feet of the face of the fire blinds.

SUMMARY OF EFFECT.

The blinds after 30 minutes' test remained in position, the fire not having come through the door or window.

DESCRIPTION OF TESTING PLANT.

The Testing Chamber used was located at the Committee's Testing Station and was known as Hut No. 2.

The hut was constructed, as shewn, of stock bricks with lime mortar, and measured 10 ft. by 10 ft. internally.

The ceiling of the hut was 9 ft. 8 in. above the pavement of the chamber and was formed of solid wood beams grouted with fire-clay.

A brick wall, 14 in. thick, was built across the hut, running from east to west. It was built 13 ins. back from the main wall.

The wall was carried up to the ceiling, the height between floor and ceiling being 9 ft. 6 in. There were two openings in the wall, one for a window and one for a door, both 3 ft. 3 in. wide. The two openings were arched over with brick arches in two half-brick rings. The wall was built with gauged stuff.

The fuel used was gas produced at the station and the supply was regulated by valves and dampers.

The gas was admitted through two mixing chambers of fire brick, as shewn.

Two Roberts-Austen pyrometers were used for recording temperatures, to take four observation records from points Nos. 1, 2, 3, 4, points 2 and 3 being outside the blinds and the others on the fire side of the blinds. A continuous record was also taken from point No. 5.

There were observation holes in the east and west walls, closed by moveable shutters.

The draught holes were in the east and west walls.

The photographs were partly taken by daylight and partly by flashlight.

DESCRIPTION OF THE BLINDS.

(*See Figs.* A. *to* E.)

On May 21st, 1900, the blinds were put into position, the iron fittings shewn in Fig. E. being fixed into the walls, and the blinds attached to the blind rollers, and the latter suspended by stout blind cord.

The blinds were of the size shewn in Fig. E. The material of which the blinds were manufactured was stated to be asbestos cloth, supplied by the Cape Asbestos Company, and known as "E" brand.

When the blinds were lowered the rollers at the bottom were held in position by the iron automatic catches shewn in Fig. E.

THE TEST.

(*Figs.* 1 *to* 6.)

On May 23rd the Test was undertaken. The following is a log of the test:—

At 3 p.m. the meteorological observations taken at the Botanic Gardens, Regents Park, read as follows:—

State of weather, fair; Wind, S.W.; Barometer (no record); Attached thermometer (no record): Wet bulb, 52·5° Fahr.; Dry bulb, 57·5° Fahr.

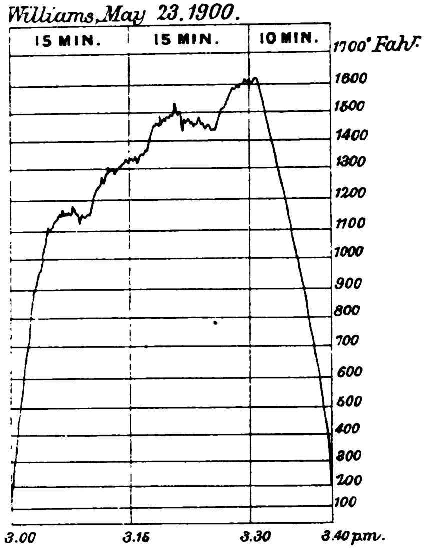
The following temperature observations were taken during the test from points Nos. 1 and 4 (inside the chamber), and Nos. 2 and 3 (outside the chamber).

OBSERVATIONS TAKEN AT POINTS NOS. 1, 2, 3, AND 4.

TIME.	INSIDE.		OUTSIDE.	
	Point No. 1	Point No. 4	Point No. 2	Point No. 3
	Fahr.	Fahr.	Fahr.	Fahr.
3.3 p.m.	730°	*	...	...
3.6 ,,	1050°	*	...	...
3.9 ,,	1100°	*	...	...
3.12 ,,	1260°	*	...	...
3.15 ,,	1320°	1280°	...	...
3.18 ,,	1430°	1410°	...	...
3.21 ,,	1490°	1440°	...	...
3.24 ,,	1450°	1400°	...	...
3.27 ,,	1515°	1480°	...	...
3.30 ,,	1580°	1520°	100°	100°
3.33 ,,	1250°	1200°	110°	110°

* These readings could not be taken owing to the junctions having been disturbed.

The following is a diagram showing the record taken from Point No. 5 by the continuous recorder.



At 2.55 p.m. the blinds were intact and rolled up.

At 3.0 p.m. the gas on the east side of the Hut, opposite the window, was lighted, the blind lowered and the window closed; immediately afterwards the gas on the west side was lighted, the west blind lowered and the door closed.

At 3.4 p.m. all the squares of glass in the door and window were cracked.

At 3.7 p.m. the cords by which the blinds had been lowered were burnt; all the glass was so hot that the hand could not be held upon it. Steam or vapour was coming from the joint between the head of the door and frame and also through the centre joint of the casement.

At 3.17 p.m. liquid of a brown colour was coming through some of the cracks in the glass on to the outside face. The thermometer hung on the outside, about 1 in.

from the surface of the glass, registered 180 degrees Fahr.

At 3.22 p.m. large quantities of vapour coming from the joints mentioned at 3.7 p.m.

At 3.23 p.m. flame observed inside the chamber from between the blinds and the window and door, greatest from the one covering the door (west side); this flame had about 3 ft. projection from the wall and appeared at intervals. The thermometer on outside registered 300 degrees Fahr.

At 3.30 p.m. the gas was turned off and the test concluded.

Note.—Up to this time no flame had passed through the door or window.

Note.—The photograph shewn in Fig. 8 was taken at 3.30 p.m.

OBSERVATIONS AFTER THE TEST.

See Figs. 9 *to* 13.

Immediately after the test the following observations were made.

At the moment of turning off the gas, flame appeared all over the surface of the glass in the window and door, between it and the blinds, burning the surface of the door and window next the fire.

At 3.35 the window was opened and the flame on the inside face of the sashes and frame extinguished with water applied by a hand pump.

At 3.40 p.m. the door was opened and the flame on the inside face extinguished as last described.

Note.—At 3.45 p.m. the photograph shewn in Fig. 13 was taken.

The sheet-glass in the upper part of the door and the plate-glass in the window was cracked and fractured very considerably, but no pieces had fallen out.

When the casement was opened it was seen that the inner part of the frame was burnt to an average depth

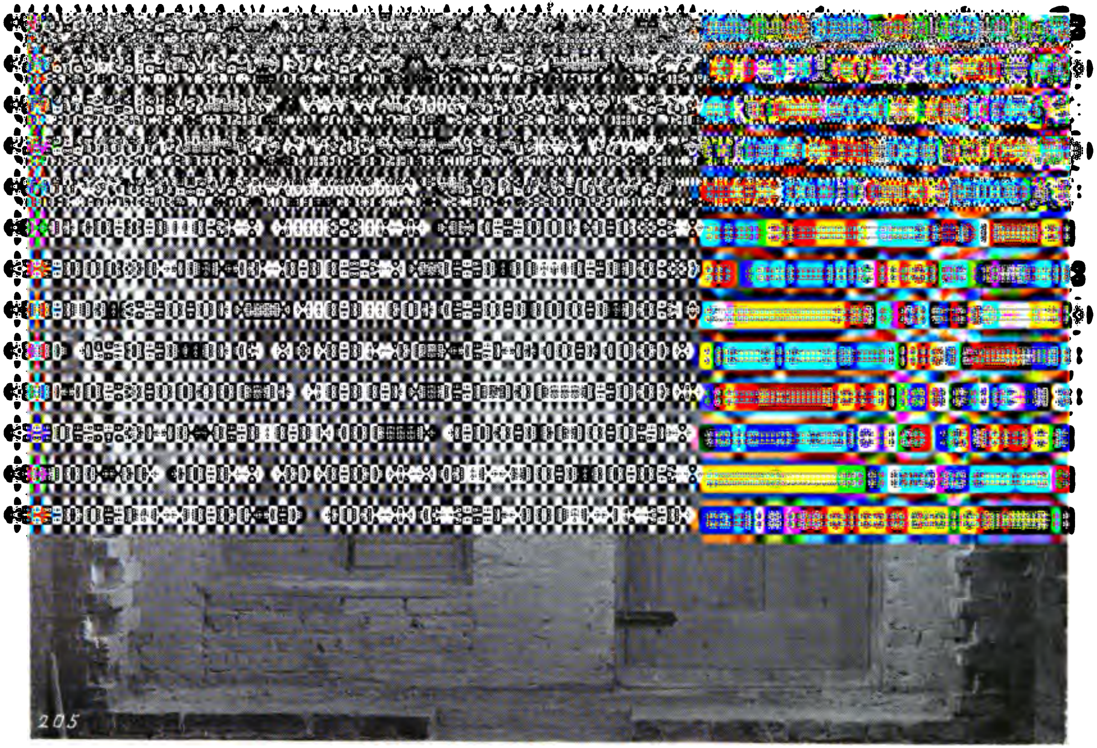


Fig. 7. View of Window and Door before Test.

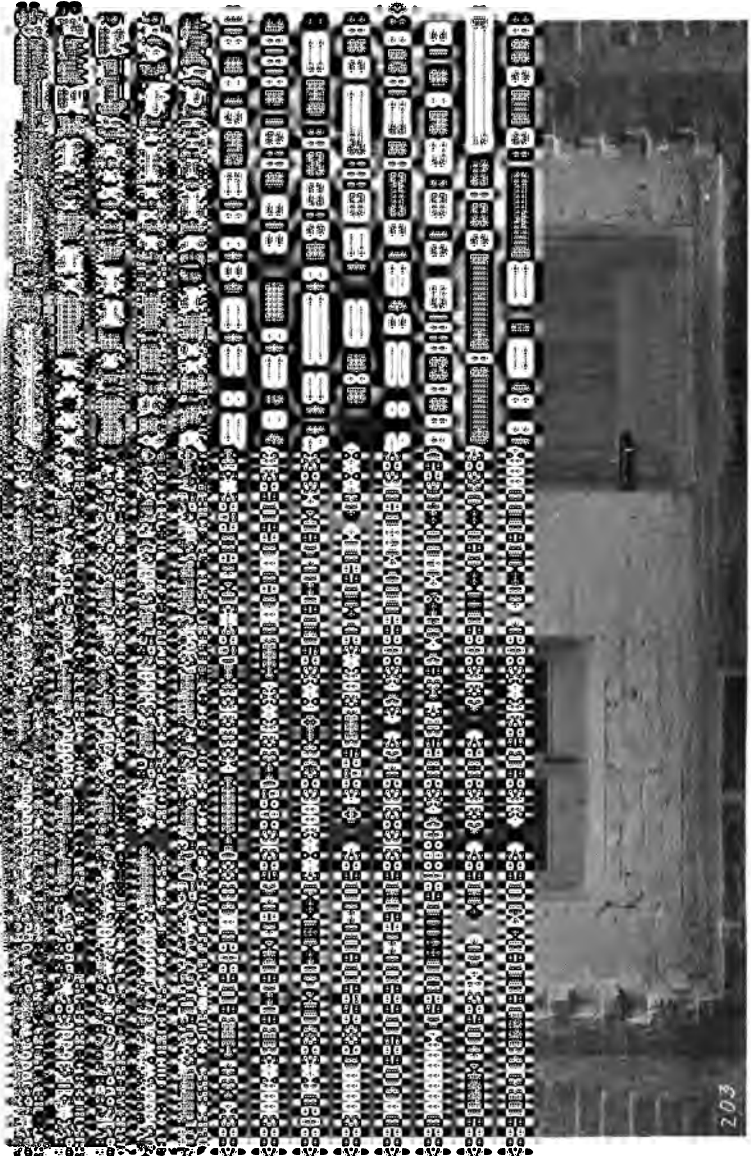
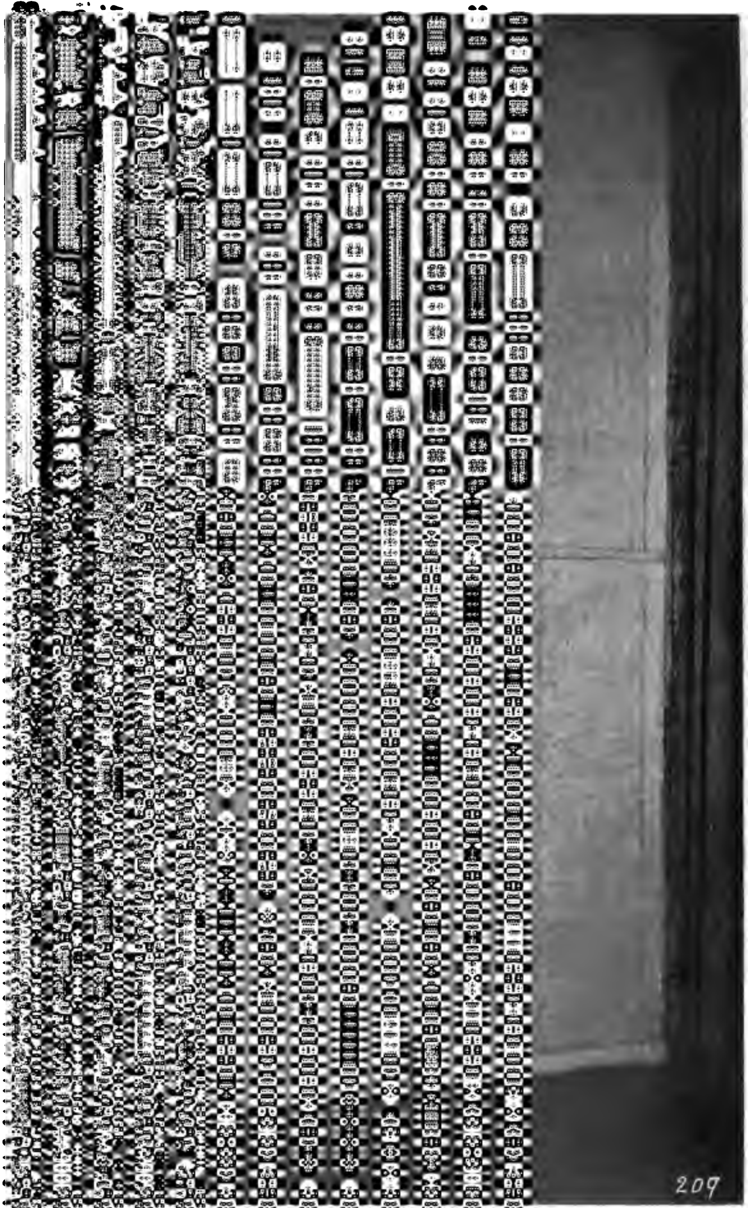
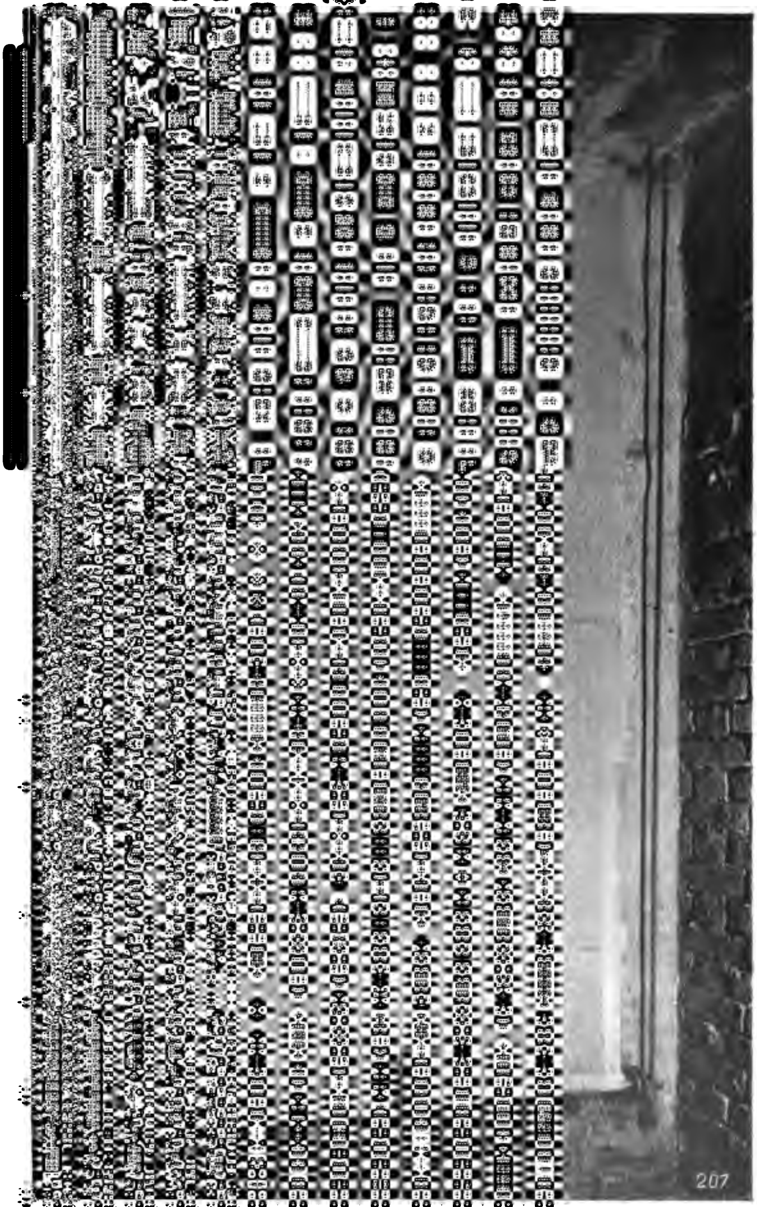


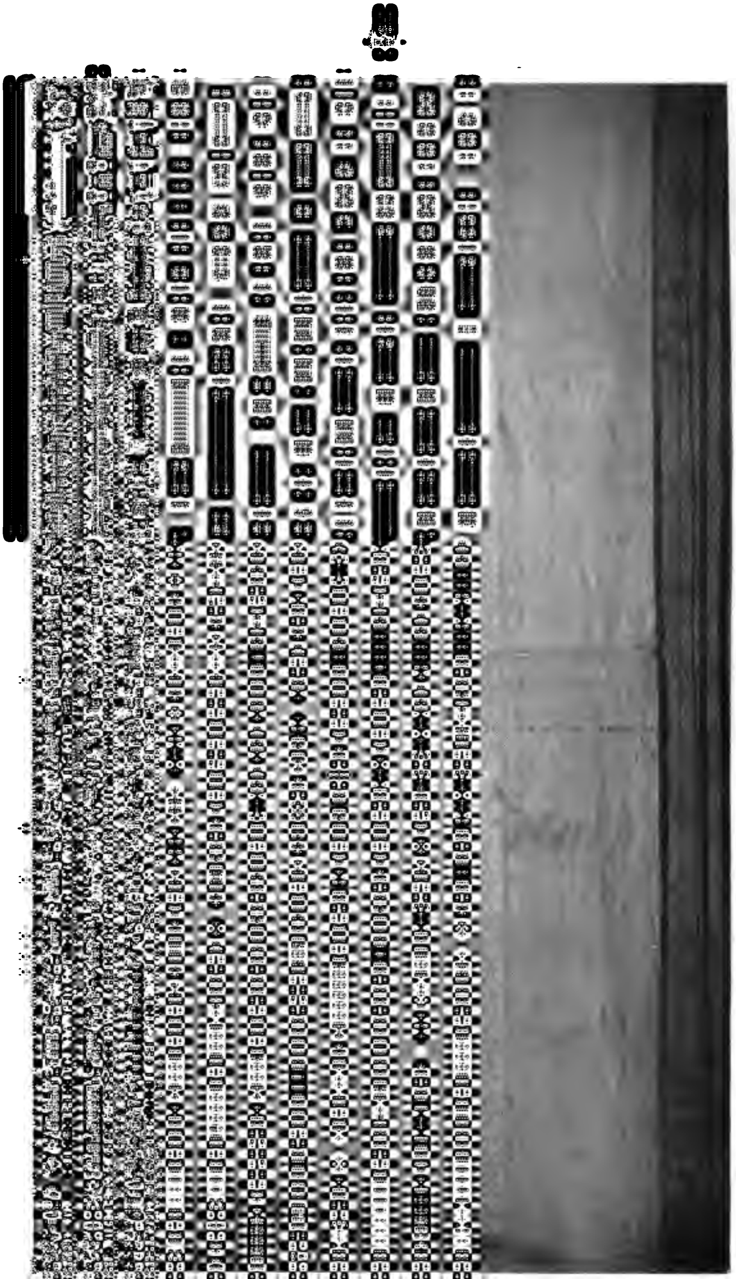
Fig. 8. VIEW OF WINDOW AND DOOR EXACTLY AT CONCLUSION OF TEST.



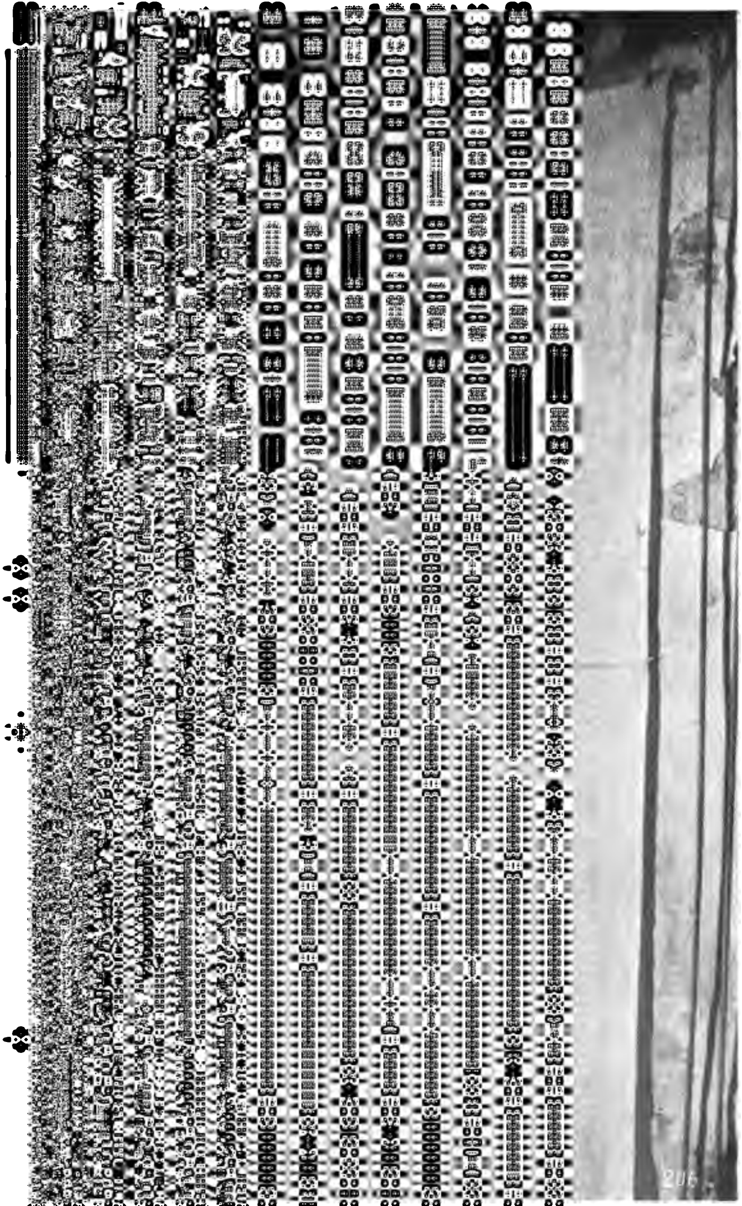
[illegible]ST (FROM FIRE SIDE).



[illegible] (from Fire Side).



[illegible] Test (from Fire Side).



[illegible] FROM FIRE SIDE).

of ½ in., also the wood glazing bars and the casement generally to a similar depth. The outside of the casement was slightly blackened by smoke, but not burnt. The hinges and bolts were uninjured. The fire blind and fastenings were not damaged so far as appearances went, except for the burnt cords before mentioned.

The door, when opened, was found to be burnt all over the inner surface to a depth similar to the window, the sash bars and glazing fillets were burnt down to the glass face. Part of one square of glass fell out when the door was opened, and shortly after portions of two others fell out on the application of water. The outer face of the glazing bars next the glass were blackened, and over the top of the door the joint to frame was also blackened, but no sign of fire having come through, except at the west side, near head, in the joint between door and frame.

A hole, about 2 in. long by ¾ in. wide, was burnt through the door on the east side of the centre muntin half way up the east lower panel. The hinges, handle and bolts were uninjured. The fire blind and fastenings were not damaged so far as appearances went, except for the burnt cords before mentioned.

GENERAL ARRANGEMENTS.

The test was carried out according to the procedure laid down by the Executive for investigations of this description and conducted by a Sub-Committee of the Executive, comprising:—

Mr. Max Clarke, A.R.I.B.A. (Directing Member).
Mr. Ellis Marsland (District Surveyor, Camberwell).
Mr. Hammond, F.R.I.B.A., District Surveyor, East Hampstead.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.
Mr. H. B. White, M.I.E.E., superintended in the Instrument Room.

The Council was represented by:

Mr. H. H. Collins, F.R.I.B.A., F.S.I., District Surveyor, Eastern Division of City of London; Past President District Surveyors' Association.

The Executive was represented by:—

Mr. Edwin O. Sachs, F.S.S. (Chairman).
Mr. T. E. Gatehouse, F.R.S.Ed., A.M. Inst. C.E., M.I.M.E., M. Inst. E.E.
Mr. Chas. E. Goad, M.Am.Soc.C.E., M.Can.Soc.C.E.

The Commercial Section was represented by:—

Mr. Frederic R. Farrow, F.R.I.B.A.

The Members' Testing Sub-Committee was represented by:—

Mr. George E. Monckton, M.A.

The general body of Members was represented by:—

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Mr. William Cooper, M.S.A.
Mr. A. Creer, A.M. Inst. C.E., M.S.I., City Engineer and Surveyor, York.
Mr. A. Fearnhead.
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Mr. Frank Sumner, A.M. Inst. C.E., Engineer and Surveyor to the Vestry of Bermondsey.
Mr. Thomas Wilkins, F.G.S.
Mr. Oswald C. Wylson, F.R.I.B.A.

Messrs. G. A. Williams & Son were represented by:—

Mr. Alfred Williams, Mr. G. A. Williams and Dr. G. J. Williams.

The following visitors attended by special invitation of the Executive:—

Mr. H. Chilton; Mr. A. J. Constable; Mr. C. Constable; Mr. Bernard Green; Mr. E. Jenner; Mr. J. A. Gill Knight, A.R.I.B.A.; Mr. W. H. Knight; Mr. H. Lewis; Mr. E. H. Runnacles; and Mr. E. J. Sadgrove.

Signed,

For the Sub-Committee conducting the test:
MAX CLARKE
(*Directing Member*).

For the Commercial Section:
FREDERIC R. FARROW.

For the Executive:
EDWIN O. SACHS
(*Chairman*).

Published by the Committee as directed by the Executive.

H. S. TAYLOR
(*Assist. Secretary*).

Date—November 10*th*, 1900.

Verified a true copy of the Report ordered to be published.

WILLIAMSON, HILL & Co.
(*Solicitors*).

Date—November 15*th*, 1900.

tions of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 52.

by Edwin O. Sachs.

RE TESTS WITH PARTITIONS.

A PARTITION

FORMED WITH

"MACK" PATENT SLABS,

AND ERECTED BY

MESSRS. J. A. KING & CO.,

LONDON.

The Committee's Report.

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LONDON, 1900.

PUBLISHED AT THE OFFICES OF
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27. FIRE TESTS with PARTITIONS. A Match-boarded Partition filled in with Silicate Cotton (Slag Wool) by Messrs. T. Anderson & Son, and Messrs, T. Broadbent & Co.
28. FIRE TESTS with CEILINGS. A Ceiling of Silicate Cotton (Slag Wool) by Messrs. T. Anderson & Son, and Messrs. T. Broadbent & Co.
29. FIRE TESTS with GLASS. Three Casements glazed by the British Luxfer Prism Syndicate, Ltd.
30. FIRE TESTS with GLASS. Five Skylights glazed by the British Luxfer Prism Syndicate, Ltd.
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33. FIRE TESTS with GLASS. A Casement glazed with ¼-in. Plate Glass; a Casement glazed with 32-oz. Sheet Glass; a Casement glazed with "Lead Lights."
34. FIRE TESTS with FLOORS A Floor of Steel Joists with Coke Breeze Concrete.
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OBJECTS OF THE COMMITTEE:

The main objects of the Committee are :—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts, and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account to be read as expressions of opinion, criticisms, or comparisons.

NOTE.

The question of rapidly forming light fire-resisting partitions is one that is constantly before architects, and the report here presented should be a valuable contribution towards the records on this subject.

As time is such a matter of importance, special attention should, perhaps, be called to the fact that the time allowed for the construction and drying of this partition was to be three weeks, and that, as a matter of fact, the construction of the partition was commenced on May 1st and the test actually took place on May 23rd.

EDWIN O. SACHS.

LONDON,
July 15*th*, 1900.

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurrences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman.*

OFFICIAL REPORTS

OF THE

British Fire Prevention Committee.

[FOUNDED 1897.—INCORPORATED 1899.]

FIRE TEST No. 21.—MAY 23RD, 1900.

A PARTITION

FORMED WITH

"MACK" PATENT SLABS,

AND ERECTED BY

MESSRS. J. A. KING & Co.,

LONDON.

OBJECT OF TEST.

To record the effect of a fire of one hour and a quarter duration, commencing at 500° Fahr. and increasing to 2,000° Fahr., followed by the application of water for two minutes on the fire side.

Note.—The area of the partition under investigation was to be at least 75 ft. superficial, with a width of 10 ft.

Note.—The time allowed for the construction and drying of the partition was to be three weeks (spring).

SUMMARY OF EFFECT.

The setting coat on the fire side of the partition fell during the application of heat.

A portion of the rendering on the fire side fell on the application of water.

The fire did not pass through the partition.

No effects of the fire were apparent on the passage side of the partition, except two blisters and some hair cracks following the courses of the joints.

The temperature of the outside face of the partition at no time exceeded 125° Fahr.

The plastering in the inner face of the partition was cracked and disintegrated.

On examination after the test, the face of the slabs next the fire was disintegrated to a depth of about ¾ of an inch, the remainder of the slabs being unaffected.

DESCRIPTION OF TESTING PLANT.

(*See Figs.* 1 *to* 4.)

The Testing Chamber used was located at the Committee's Testing Station, and was known as "No. 5 Hut."

The hut was constructed, as shown, of stock bricks, with lime mortar, and measured 10 ft. by 10 ft. internally.

The ceiling was 7 ft. 7½ in. above the pavement of the hut, and was constructed of wood beams.

The hut was covered in with a tarpaulin.

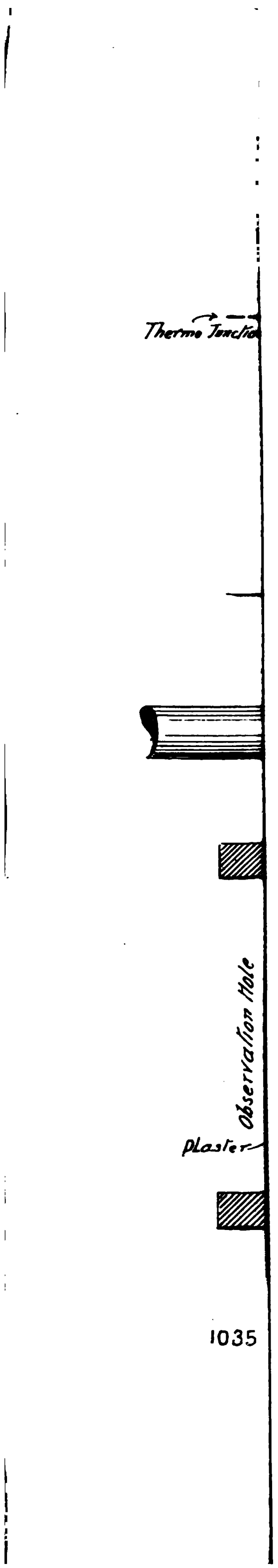
The door, opening in the north wall, measured 2 ft. by 6 ft. 6 in., and was open during the test.

The fuel used was gas produced at the station, and the supply was regulated by valves and dampers.

The hut was divided as shown on plan, the partition being constructed from east to west, the full width and height of the hut, leaving the passage on the outside 2 ft. wide.

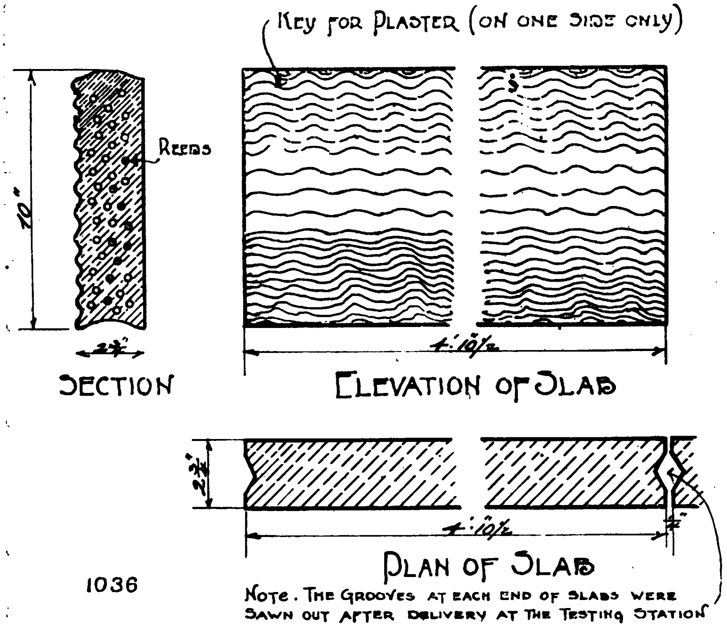
The gas was admitted through two mixing chambers of fire-brick, each 7 ft. 9 in. by 3 ft. 6 in., as shown.

Two Roberts-Austen pyrometers were used for recording temperatures, one taking a continuous record from point No. 5, and one being used for the observation records at points Nos. 1, 2, 3, 4. Points Nos. 1, 4, 5 were inside the chamber, and Nos. 2 and 3 outside in the passage.


Thermo Junction
Observation Hole
Plaster
1035

There were two observation holes, one in the east and one in the west walls, and two small observation holes in the south wall.

The stream of water was applied to the inside face of partition, through the observation hole on the west side, by a branch with ½ in. nozzle, and supplied from a manual fire engine similarly equipped.



Note. The grooves at each end of slabs were sawn out after delivery at the Testing Station

The Partition. *Fig.* 5. Details of Slabs.

CONSTRUCTION OF THE PARTITION.

See Figs. Nos. 1 *to* 5.

Plans, elevations and sections of the partition are shown.

The construction of the partition was as follows :—

On April 26th the material was delivered at the Testing Station.

On May 1st the east and west walls where the partition abutted against them had a coat of plaster 10 in. wide and 1 in. thick.

Two plaster slabs, each 10 in. wide and 1 in. thick, were nailed to the ceiling immediately over the partition with 2¾ in. galvanised iron nails.

On May 1st, 2nd and 3rd the partition was erected. A course of stock bricks was laid on the floor of the hut, and the slabs forming the partition were built on these and carried up to the underside of ceiling-slabs, a height of 7 ft. 5 in. The partition was composed of slabs, each 10 in. in height and 2⅜ in. thick, and of lengths varying from 1 ft. 6 in. to 4 ft. 10½ in.

The slabs, according to the maker, were made of plaster, with cocoanut fibre, cork dust and reeds embedded therein and running horizontally along the whole length of same. There were from 30 to 40 reeds in each slab. The slabs were delivered at the Testing Station with square ends. The ends were afterwards sawn out to form the vertical V joints.

The slabs were set with mortar mixed in the proportion of two parts of plaster of Paris, one part of lime, and two parts of sand. The vertical joints were grouted in with the same material.

The inside face of each slab was keyed for plaster.

The outside face, being smooth, was afterwards scratched or "devilled" to form a key.

On May 3rd and 4th the inside of partition was plastered one coat of coarse stuff, composed of plaster of Paris and sand in equal proportions.

On May 15th the second or finishing coat was put on (inside face of partition). This was made with plaster, sand and lime in the proportion of one part of plaster of Paris, two parts of sand, and one part of lime.

On May 4th the outside of partition was plastered one coat with lime putty, and plaster of Paris in equal proportions, mixed with water, to which a small proportion of sugar was added.

The plaster on the inside of partition was 1 in. thick, that on the outside was ¼ in. thick.

On May 8th a horizontal crack was observed on the outside of partition, 5 ft. 6 in. from the floor and running half-way across the partition on the west side. The plaster around this was cut away, and on the 15th May was made good with plaster of Paris.

There was a plaster fillet around the angles of partition and at floor, covering the course of stock bricks upon which the partition was built.

The weather report on May 1, 2, 3, 4 and 15, when the partition was being erected, was as follows:—

May 1st, very fine; highest in air 59·8° Fahr.

May 2nd, very fine; highest in air 64° Fahr.

May 3rd, fine, strong wind; highest in air 56·2 Fahr.

May 4th, fine, mild; highest in air 61° Fahr.

May 15th, strong cold wind; highest in air 57·5 Fahr.

PREPARATIONS FOR THE TEST.

On May 19th coke fires (two on each side of partition) were lighted and kept in continuously until May 23rd, noon.

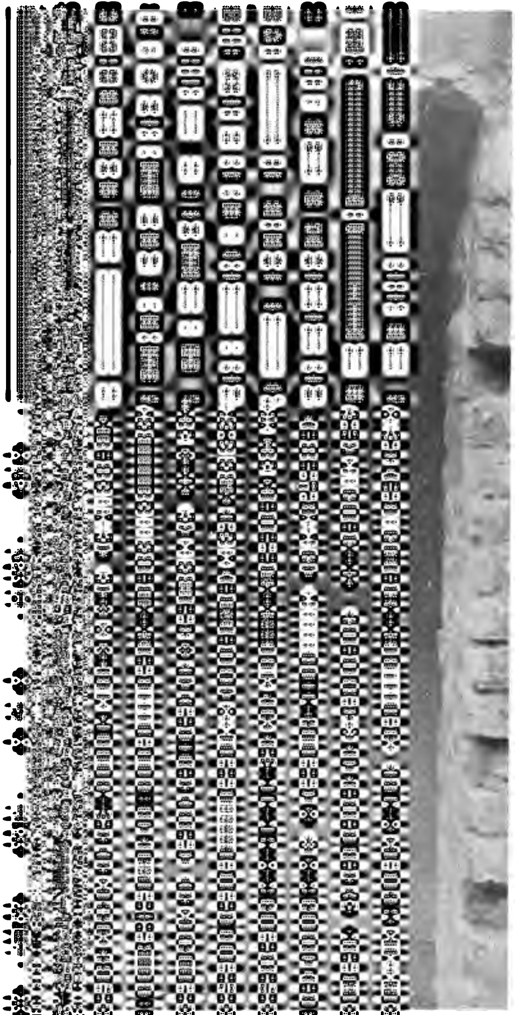
THE TEST.

On May 23rd the test was undertaken. The following is a log of the test:—

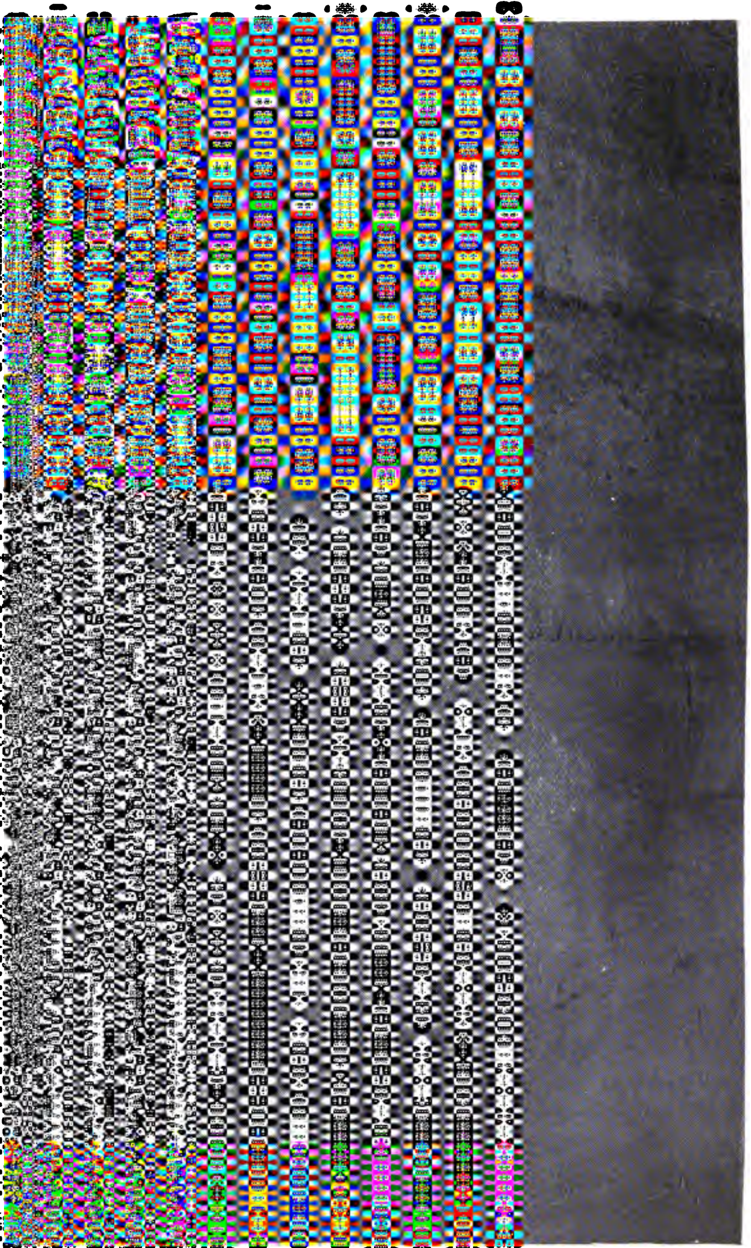
At 3 p.m. the meteorological observations, taken at the Botanic Gardens, Regent's Park, read as follows:—

"State of weather, fair; Wind, S.W.; Barometer, not taken; Attached Thermometer, not taken; Wet Bulb, 52·5° Fahr.; Dry Bulb, 57·5° Fahr; Remarks: Unsettled, showery, changeable afternoon."

At 3.30 p.m. the gas was lighted.



[illegible] through Door of Hut outside
[illegible]



[illegible] Showing [illegible] Part of Partition [illegible] Side).

At 3.32 p.m. the setting coat of plaster on the fire side of partition commenced to blow off.

At 3.34 p.m. the setting coat had all blown off.

At 3.35 p.m. fine hair cracks, following the horizontal joints of the slabs, began to appear on the passage side of partition.

At 3.41 p.m. steam began to issue at various points from these joints.

At 3.44 p.m. fine hair cracks following the vertical joints of slabs began to appear on the passage side of partition.

At 4.11 p.m. the fine hair cracks in the vertical joints almost closed up.

At 4.15 p.m. the setting coat of plaster on the passage side of partition showed two blisters about the centre, one at the level of the 5th joint and the other at the level of the 7th joint.

The following temperatures were taken on the passage side of the partition by the aid of a thermometer hung against the partition, but the bulb not touching the face of the plaster :—

3.51 p.m.	...	100°	Fahr.
4.5 ”	...	110°	”
4.17 ”	...	125°	”
4.45 ”	...	125°	”

At 4.45 p.m. the gas was turned off.

The fire had not passed through the partition, and the surface on the passage side, except for the hair-cracks and two blisters before mentioned, was unaffected by the fire.

At 4.46 water was turned on to the inside face of the partition for two minutes, at 20 lbs. pressure.

The effect of this was to wash off some of the rendering where struck by the water, but no other effect was apparent.

The temperatures, as read from the observation record off pyrometer points, Nos. 1, 2, 3 and 4, were as follows:

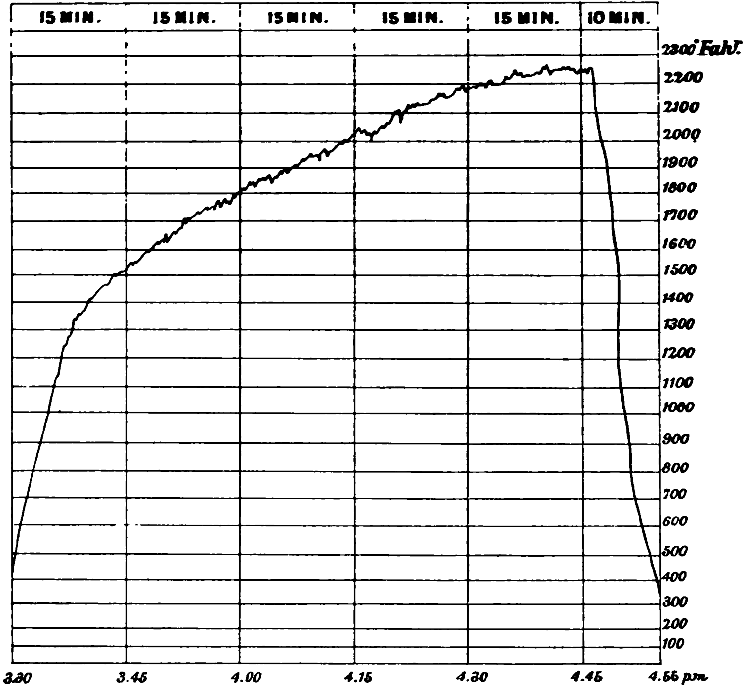
OBSERVATIONS TAKEN FROM POINTS NOS. 1, 2, 3, 4.

From 3.35 *p.m.* *to* 4.45 *p.m.*

	INSIDE.		OUTSIDE (IN PASSAGE).	
TIME.	No. 1. Fahr.	No. 4. Fahr.	No. 2.	No. 3. Fahr.
3.35 p.m.	1,000°	1,050°	—	—
3.40 „	1,350°	1,300°	—	—
3.45 „	1,450°	1,410°	—	—
3.50 „	1,550°	1,450°	—	—
3.55 „	1,600°	1,600°	—	—
4.0 „	1,600°	1,660°	—	100°
4.5 „	1,680°	1,720°	—	105°
4.10 „	1,720°	1,760°	—	100°
4.15 „	1,780°	1,860°	—	105°
4.20 „	1,840°	1,940°	—	95°
4.25 „	1,900°	1,980°	—	90°
4.30 „	1,920°	2,000°	—	—
4.35 „	1,900°	2,050°	—	—
4.40 „	1,980°	2,050°	—	—
4.45 „	1,960°	2,040°	—	—

The temperature, as shown by the automatic record point 5 (inside, was as follows :—

Mack. May 23. 1900.



OBSERVATIONS AFTER TEST.

(*Figs.* 6, 7, *and* 8.)

On May 24th the following observations were made :—

The face of the partition on the passage side had undergone no change since the conclusion of the test.

The whole of the setting coat on the inside had fallen.

Part of the rendering where struck by the water was washed away.

The plastering generally was disintegrated and showed cracks in line with the horizontal joints of slabs.

A piece of the plaster about 8 in. in diameter, 2 ft. from west wall and 3 ft. from floor, was detached, leaving the face of one of the slabs, forming the partition, exposed *(see Fig. 8)*.

The inside row of reeds embedded in the slabs forming the partition was charred, and the surface of the slabs on the fire side for about ¾ of an inch was disintegrated.

GENERAL ARRANGEMENTS.

The test was carried out according to the procedure laid down by the Executive for investigations of this description and conducted by a Sub-Committee of the Executive, comprising:—

Mr. Ellis Marsland, District Surveyor, Camberwell.
Mr. F. Hammond, F.R.I.B.A., District Surveyor, East Hampstead.
Mr. T. E. Gatehouse, F.R.S.Ed., A.M. Inst. C.E., M.I.M.E., M. Inst. E.E.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.

Mr. H. B. White, M.I.E.E., Superintendent in the Instrument Room.

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The Executive was represented by:—

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Mr. Max Clarke, A.R.I.B.A.
Mr. Chas. E. Goad, M.Am.Soc.C.E., M.Can.Soc.C.E.

The Commercial Section was represented by:—

Mr. Frederic R. Farrow, F.R.I.B.A.

The Members' Testing Sub-Committee was represented by:—

Mr. George E. Monckton, M.A.

The general body of members was represented by:—

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Mr. William Cooper, M.S.A.
Mr. A. Creer, A.M.I.C.E., M.S.I., City Engineer and Surveyor, York.

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Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 53.

Edited by Edwin O. Sachs.

FIRE TESTS WITH PARTITIONS.

A PARTITION
KNOWN AS
THE "CUNNAH-WRIGHT" PARTITION
ERECTED BY
THE FIREPROOF PARTITION SYNDICATE, LTD.,
LONDON.

The Committee's Report.

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LONDON, 1900.

PUBLISHED AT THE OFFICES OF
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Messrs. J. A King, J. King, E. C. Browne, A. E. Faulkner, and O. Mack.

The following visitors attended by special invitation of the Executive : —

Messrs. H. Chilton, A. J. Constable, C. Constable, Bernard Green, Edward Jenner, J. A. Gill Knight, A.R.I.B.A., W. H. Knight, H. Lewis, E. H. Runnacles, E. J. Sadgrove, and Geo. H. Trollope.

Signed,

For the Sub-Committee conducting the Test:

ELLIS MARSLAND (*Directing Member*).

For the Commercial Section:

FREDERIC R. FARROW.

For the Executive:

EDWIN O. SACHS (*Chairman*).

Published by the Committee as directed by the Executive.

H. S. TAYLOR
(*Assist. Secretary*).

Date—August 15*th.*

Verified a true copy of the Report, ordered to be published.

WILLIAMSON, HILL & Co.
(*Solicitors*).

Date—September 15*th.*

Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 53.

Edited by Edwin O. Sachs.

FIRE TESTS WITH PARTITIONS.

A PARTITION
KNOWN AS
THE "CUNNAH-WRIGHT" PARTITION
ERECTED BY
THE FIREPROOF PARTITION SYNDICATE, LTD.,
LONDON.

The Committee's Report.

ALL RIGHTS RESERVED.

LONDON, 1900.

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46. FIRE TESTS WITH FIRE RESISTING CURTAINS. Two "Screen-Sail" Curtains by Mr. Rasmus Bugge.
47. FIRE TESTS WITH PARTITIONS. A Match-boarded Partition filled in with Silicate Cotton (Slag Wool) by Messrs. D. Anderson & Son, Ltd., London, and Messrs. J. C. Broadbent & Co., Ltd., London.
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OBJECTS OF THE COMMITTEE.

The main objects of the Committee are:—

To direct attention to the urgent need for increased portection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account intended to read as expressions of opinion, criticisms, or comparisons.

NOTE.

The question of rapidly forming light fire-resisting partitions is one that is constantly before architects, and the Report here presented should be a valuable contribution towards the records on the subject.

As time is such a matter of importance, special attention is called to the fact that the time allowed for the construction and drying of this partition was four weeks. The construction of the partition was actually commenced on March 9th, and the test took place on April 11th.

In connection with the issue of this Report, it may be of interest to know that the maker has applied for a further test with a partition, which he proposes to give a longer time for construction and drying; the extent of the test, however, to be limited to one hour instead of one hour and a quarter, as in the present case.

EDWIN O. SACHS.

LONDON,
June 15*th*, 1900.

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically, or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman.*

OFFICIAL REPORTS

OF THE

British Fire Prevention Committee.

[FOUNDED, 1897.—INCORPORATED, 1899.]

FIRE TEST NO. 22.—11TH APRIL, 1900.

A PARTITION

KNOWN AS

THE "CUNNAH-WRIGHT" PARTITION

ERECTED BY

THE FIREPROOF PARTITION SYNDICATE, LTD.,
LONDON.

OBJECT OF TEST.

To record the effect of a fire of one hour and fifteen minutes' duration, commencing at about 500° Fahr. and increasing to 2,000° Fahr., followed by the application of water for two minutes on the fire side.

Note.—The area of the partition under investigation was to be about 80 ft. superficial, with a width of 10 ft.

Note.—The time allowed for the construction and drying of the partition was to be four weeks (winter).

SUMMARY OF EFFECT.

Hair cracks, from which the steam escaped, appeared from time to time on the passage side of the partition.

The temperature of the outside face of the partition during the latter part of the test was too hot to bear the hand, and paper held against it was scorched.

The fire did not pass through the partition during the one hour and fourteen minutes it was applied.

During the application of water to the fire side of the partition it fell inwards bodily.

Note.—The bulging of the iron studs as they became heated allowed the head of the partition to drop slightly and so made a slight space over it. Flame then spread over the top of the partition by means of the wood beams forming the ceiling to the hut, these beams being so laid as to cover both the chamber and the passage. This increased the temperature on the outside of the partition (in passage).

Note.—See the diagram, Fig. 7, for the progress and extent of the bulging referred to.

DESCRIPTION OF TESTING PLANT.

(*See Figs.* 1 *to* 4.)

The Testing Chamber used was located at the Committee's Testing Station, and was known as "No. 1 Hut."

The hut was constructed, as shown, of stock bricks with lime mortar, and measured 10 ft. by 10 ft. internally.

The ceiling was 8 ft. above the pavement of the hut.

The hut was covered with a tarpaulin.

The door-opening in the south wall measured 2 ft. 6 in. by 6 ft. 6 in.

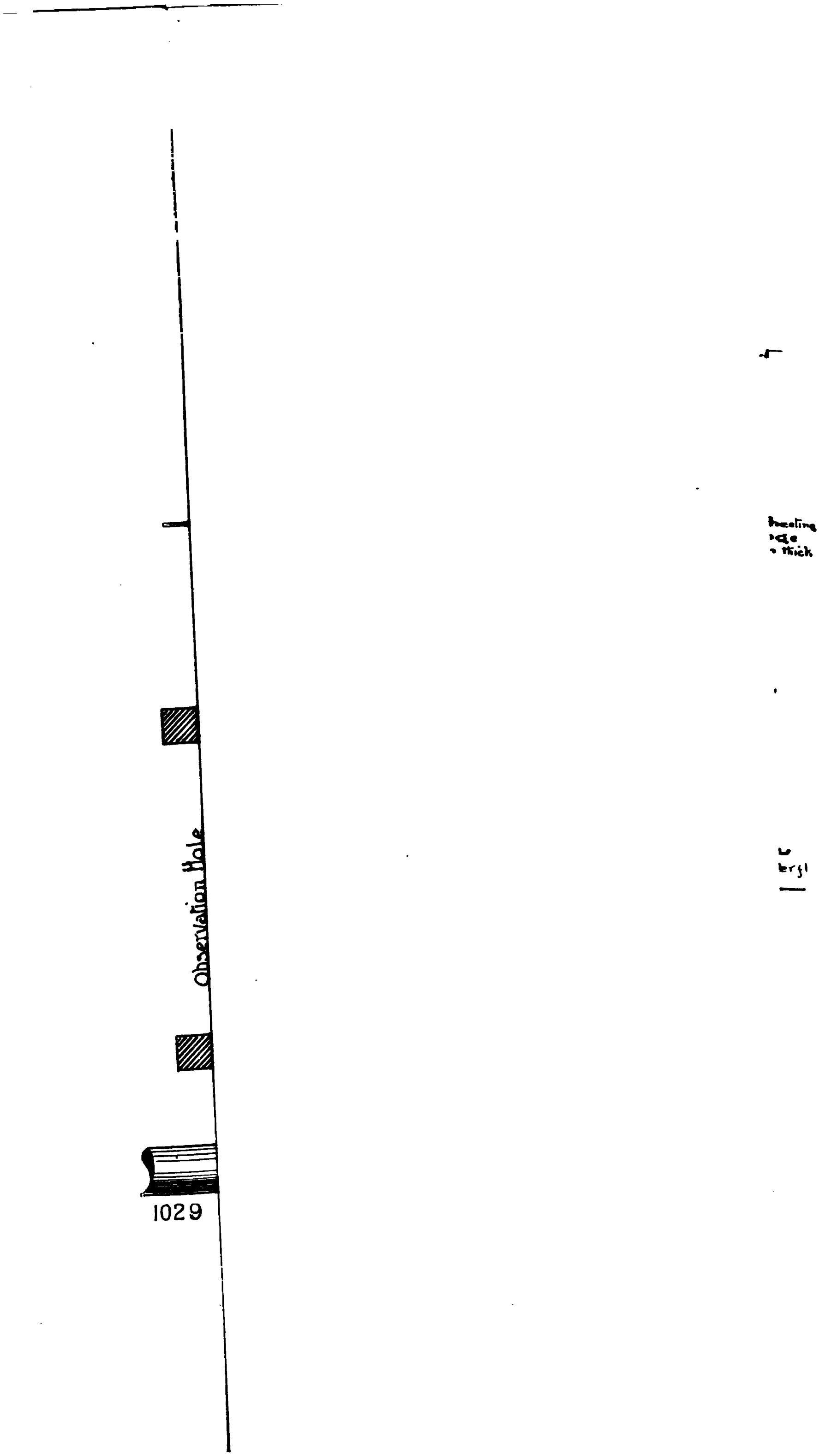
The fuel used was gas produced at the station, and the supply was regulated by valves and dampers.

The hut was divided as shown on plan, the partition being constructed from east to west, the full width and height of the hut, leaving a passage on the outside 2 ft. 3 in. wide. The size of the chamber was 7 ft. 7 in. by 10 ft.

The gas was admitted through two mixing chambers of fire brick, each 7 ft. 3 in. by 3 ft. 6 in., as shown.

Two Roberts-Austen pyrometers were used for recording temperatures, one taking a continuous record from point No. 5, and one being used for the observation record at points Nos. 1, 2, 3, 4; points Nos. 1, 2, 5 were in the chamber, and Nos. 3 and 4 outside in the passage.

There were two observation holes, one in the east and


Observation Hole
1029
eating
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thick

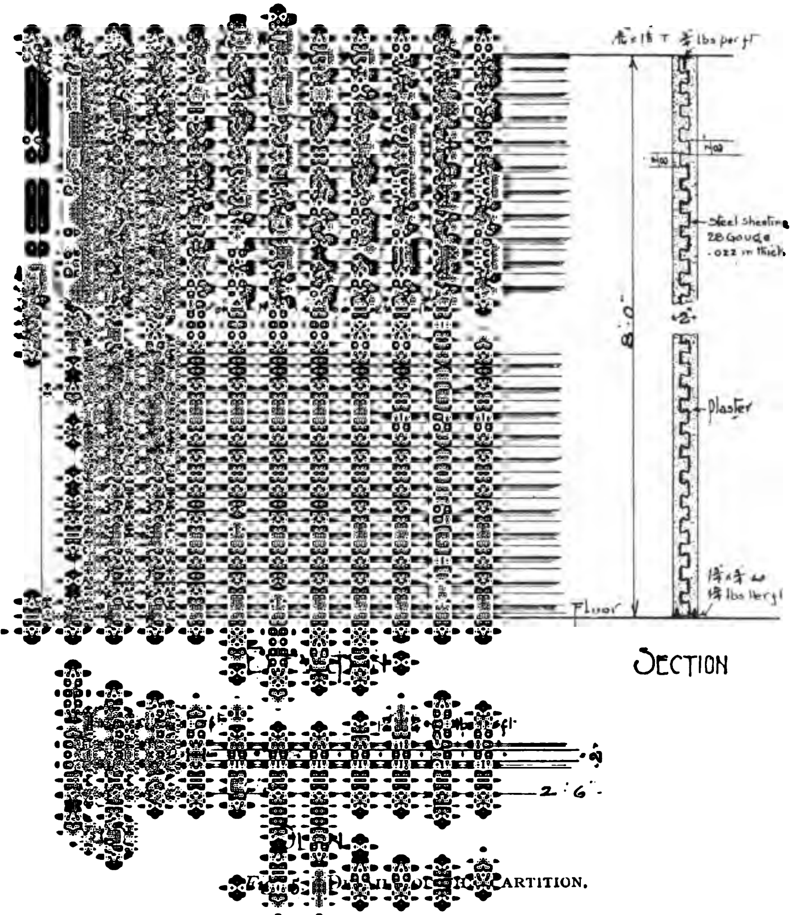


FIG. 6. DETAIL OF METALLIC PARTITION.

one in the west wall, and two small observation holes in the north wall.

The stream of water was applied to the fire side of partition through the east observation hole by a branch with a ½-in. nozzle, supplied from a manual fire engine.

CONSTRUCTION OF THE PARTITION.

(*See Figs. Nos.* 1 *to* 5.)

Plans, elevations and sections of the partition are shown.

The construction of the partition was as follows :—

On March 9th, 1900, the frame-work of the partition was erected. It was set back from the south wall of hut 2 ft. 3 in. ; it ran east and west and was 10 ft. wide and 8 ft. high from floor to ceiling.

A 1¾ in. by ¾ in. channel iron, 1¾ lbs. per ft., was laid on the floor, and a 1$\frac{3}{16}$ in. by 1⅛ in. T-iron, ¾ lb. per ft., was secured to the wooden ceiling with iron hold-fasts 2 in. long. Against each wall was a channel iron 1½ in. by ¾ in., 1⅕ lb. per ft., secured with 2 in. iron hold-fasts, and 1½ in. by 1¼ in. H-irons, 1¾ lbs. per ft., were used as uprights (or studs), spaced 2 ft. 6 in. centre to centre. The feet rested in the floor channel, and the heads were secured to the T-iron at the ceiling by cutting a narrow notch out of the vertical H-irons and letting the T-iron fit therein.

Some No. 0·28 gauge, ·022 in. thick steel sheeting, described by the maker as No. 0·28 gauge, ·022 in. thick, was used as lathing between the uprights (or studs), and went from floor to ceiling. This sheeting had ⅞ in. by ⅞ in. dovetailed corrugations, so as to form a key for plaster.

On March 10th and 12th the first and second coats of coarse stuff were put on. The material was brought on to the ground ready made. The contractor who supplied it stated that it had been made three weeks, and was in the proportion of 1 yard of grey lime, 3 yards of coarse sand, and 14 lbs. of hair. An additional 14 lbs. of hair was added on arrival at the station. Plaster of Paris was also added in the proportion of 1 bushel of plaster of Paris to 1 yard of coarse stuff.

On March 13th a coke fire was lighted on each side of the partition, and this was repeated daily until March 16th.

On March 17th the finishing coat was put on. This was made of three parts of well-seasoned lime putty, one part of washed sand, and slightly gauged with plaster of Paris. The total thickness of partition when finished was 2 in.

On March 29th, and every day until April 3rd inclusive, a coke fire was lighted in the hut on the inside of partition.

On April 2nd some small cracks which had appeared on the outside of partition were made good with plaster.

The weather report for March reads as follows:—

Rainfall for the month (taken at Camden Square) was ·79 inches, with a maximum of ·41 in. on March 18th. The maximum temperature was 58·6 Fahr. (March 12th), and the minimum 23·4 Fahr. (March 18th).

PREPARATIONS FOR THE TEST.

The tarpaulin over the hut was removed prior to the commencement of the test.

THE TEST.

(*See Fig.* 6.)

On April 11th, the Test was undertaken.

The following is the log of the Test:—

At 3 p.m. the meteorological observations, taken at the Botanic Gardens, Regent's Park, read as follows:—

State of Weather, fair; Wind, west south west; Barometer, 29·52 in.; Attached Thermometer, 53° Fahr.; Wet Bulb, 48° Fahr.; Dry Bulb, 54° Fahr. Remarks: Fine afternoon.

Observations from the outer (Southern) side.

At 2.45 p.m., immediately before the test began, a fine vertical crack was observed at the centre upright or stud on the outside face, running from top to bottom of the partition. A similar, but even finer, vertical crack was observed at the east stud, and a horizontal one at 4 ft. 3 in. above the bottom extended from the east to the west stud.

At 2.51 p.m. the gas was lighted.

At 2.57 p.m. the crack over the middle stud opened slightly.

At 2.59 p.m. steam in small quantities issued from the vertical crack at middle stud, and from the horizontal crack at about 4 ft. 3 in. from bottom.

At 3.2 p.m. thermometer hung on face of partition stood at 80°.

Note.—This was a glass tube thermometer hung to a pin driven into the face of partition. The bulb was not in close contact with the face, and the wind played freely upon it.

At 3.2 p.m. crepitations heard. A number of horizontal hair cracks appeared on the upper part of the outside face of the partition. A quantity of steam was coming off from the whole surface of partition, the greater part through these cracks.

At 3.4 p.m. thermometer on face 104° Fahr. The face generally was just too hot to bear the hand upon, and hottest over the studs.

At 3.12 p.m. a crack over east stud opened nearly $\frac{1}{16}$ in. at the top.

At 3.15 p.m. considerable crepitation audible, thermometer on face 134° Fahr. A crack was formed between wall and partition at west end $\frac{1}{16}$ in. wide.

At 3.20 p.m. thermometer on face 131° Fahr. The crack over centre stud $\frac{1}{16}$ in. open.

At 3.22 p.m. a little smoke escaping over top of partition.

At 3.28 p.m. surface over the studs discoloured by heat.

At 3.29 p.m. thermometer on face 160° Fahr.

At 3.32 p.m. crack on east stud was open for a length of 12 in. from top, $\frac{1}{10}$ in wide. Crack between partition and west wall open $\frac{1}{8}$ in.

At 3.35 p.m. thermometer on face 170° Fahr.

At 3.40 p.m. blister forming over west stud 3 ft. from floor.

At 3.42 p.m. flames appearing in small jets over top of partition in east angle.

Note.—The bulging of the iron studs as they became heated allowed the head of the partition to drop slightly and so made a slight space over it. Flame then spread over the top of the partition by means of the wood beams forming the ceiling to the hut, these beams being so laid as to cover both the chamber and the passage. This increased the temperature on the outside of the partition (in passage).

At 3.43 p.m. thermometer on face 196° Fahr.

The face of the partition, for a length of 4 ft. at the centre, lifted from floor $\frac{1}{10}$ of an inch.

At 3.46 p.m. flame coming over top of partition for a length of 1 ft. from the east wall; no other flame visible. Thermometer on face 190° Fahr. All cracks opening.

At 3.48 p.m. considerable amount of smoke issuing all along top of partition, and flame for a length of 2 ft. 6 in. from east end. Thermometer on face 210° Fahr.

At 3.51 p.m. a large blister, 2 ft. by 12 in. wide, formed on west stud about 1 ft. 6 in. above floor.

At 3.54 p.m. smoke issued from horizontal cracks near centre.

At 4 p.m. paper held against surface was scorched.

At 4.3 p.m. the partition commenced to incline bodily inwards.

At 4.5 p.m. flame was coming over top of partition along its whole length.

At 4.5 p.m. the gas was turned off.

At 4.6 p.m. water was applied to the inside face through east observation hole.

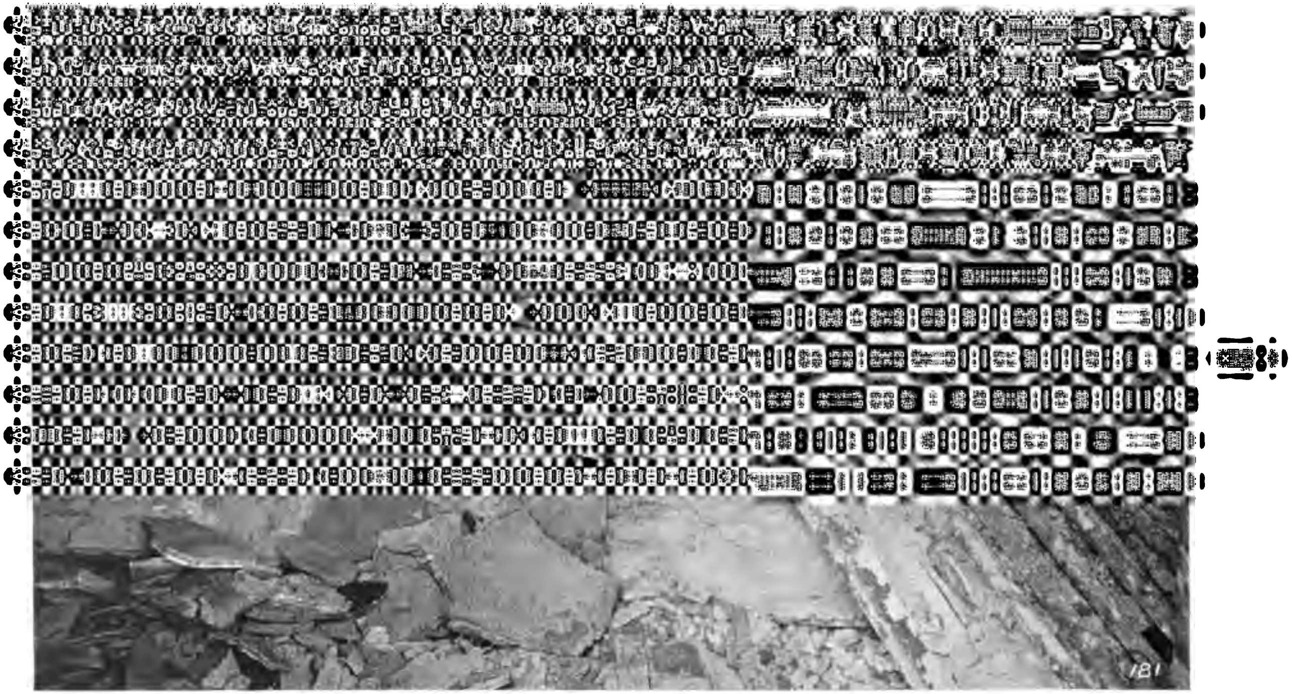
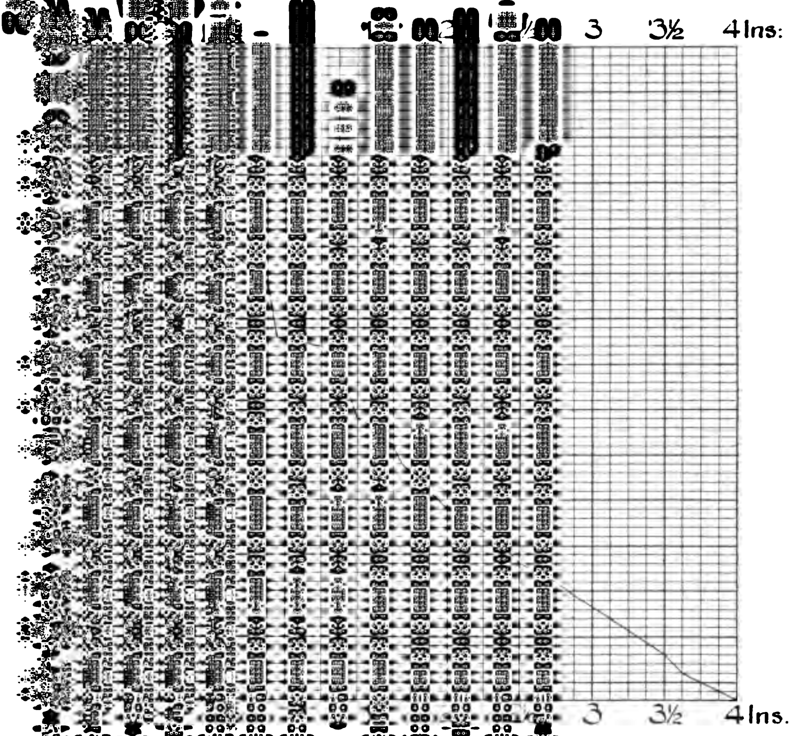


Fig. 6. VIEW SHOWING THE PARTITION AFTER TEST

[illegible] ely commenced [illegible] interior plaster [illegible] alongside the



[illegible] H THE PARTITION [illegible] EST . ALL THE [illegible] 4 FT. 7 INS. FROM [illegible] 4 INS WEST OF ITS [illegible] studs, and a great deal of the exterior plaster dropped off, the top part going first.

At 4.9 p.m. the whole partition fell bodily inwards.

The water was turned off, and the Test concluded.

Observations from the fire (Northern) side.

At 3.3 p.m. horizontal cracks, two about 6 in. apart on east bay, about the centre of height, were observed.

At 3.10 p.m. the plaster over west stud was seen to be bulging towards fire.

At 3.12 p.m. plaster bulging off central stud for a distance of 3 ft., commencing about 2 ft. above floor. A small portion of plaster had fallen out of crack for a distance of 2 ft. above floor. An area of 9 in. by 9 in. was blowing off east of central stud, and was projecting about 4 in.

At 3.15 p.m. plaster referred to at 3.12 p.m. had fallen off face of stud.

At 3.21 p.m. an area, about 6 in. diameter, blowing off about 3 ft. from floor, and on west side.

At 3.24 p.m. plaster blowing off east stud, about 4 ft. 6 in. from floor on inside face.

At 3.30 p.m. plaster had almost entirely fallen off central stud.

Note.—The diagram, Fig. 7, shows the progress and extent of the bulging that occurred in the partition during the Test.

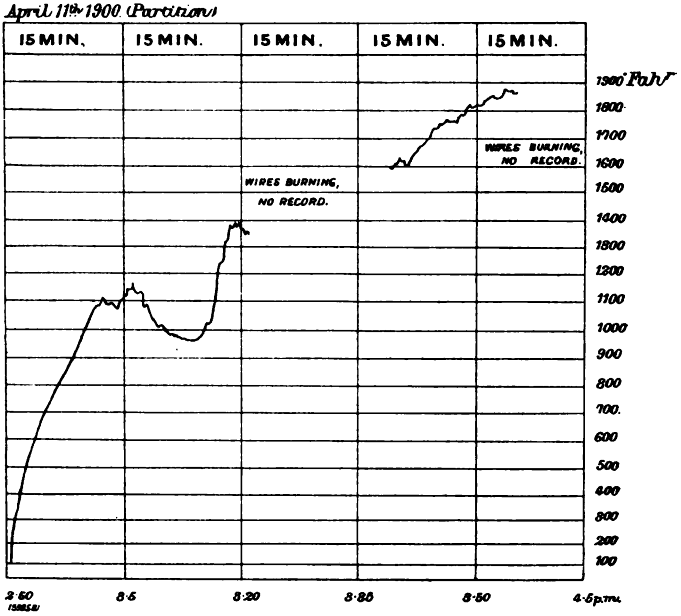
The temperatures as read from the observation record off pyrometer points, Nos. 1, 2, 3, 4, were as follows:—

OBSERVATIONS TAKEN FROM POINTS NOS. 1, 2, 3 AND 4.

	INSIDE.		OUTSIDE (IN PASSAGE).	
TIME.	No. 1. Fahr.	No. 2. Fahr.	No. 3. Fahr.	No. 4. Fahr.
2.55 p.m.	650°	700°	—	—
3.0 „	1,080°	1,040°	—	—
3.5 „	1,140°	1,090°	—	—
3.10 „	1,080°	920°	—	—
3.15 „	1,180°	1,050°	—	—
3.20 „	1,400°	1,300°	—	—
3.25 „	1,480°	1,400°	—	—
3.30 „	1,520°	1,400°	—	100°
3.35 „	1,600°	1,300°	—	100°
3.40 „	1,650°	1,400°	—	100°
3.45 „	1,800°	1,520°	—	150°
3.50 „	1,650°	1,600°	—	150°
3.55 „	1,900°	1,700°	150°	220°
4.0 „	2,000°	1,780°	120°	250°
4.5 „	1,950°	1,700°	150°	250°

Note.—The bulging of the iron studs as they became heated allowed the head of the partition to drop slightly and so made a slight space over it. Flame then spread over the top of the partition by means of the wood beams forming the ceiling to the hut, these beams being so laid as to cover both the chamber and the passage. This increased the temperature on the outside of the partition (in passage).

The temperature as shown by the automatic record Point 5 (inside) was as follows:—



OBSERVATIONS AFTER TEST.

On April 12th a photograph was taken as shown in Fig. 6.

The partition lay in sections, almost all the plaster being detached from both faces and crumbling at touch.

GENERAL ARRANGEMENTS.

The Test was carried out according to the procedure laid down by the Executive for investigations of this description, and conducted by a Sub-Committee of the Executive, comprising :—

Mr. Matt Garbutt, A.M.I.C.E., A.R.I.B.A. (Directing Member).
Mr. Max Clarke, A.R.I.B.A.
Mr. Ellis Marsland, District Surveyor, Camberwell.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.

Mr. H. B. White, M.I.E.E, superintended in the Instrument Room.

The Executive was represented by :—

Mr. Edwin O. Sachs (Chairman).
Mr. Chas. E. Goad, M.Am.Soc.C.E., M.Can.Soc.C.E.
Mr. F. Hammond, F.R.I.B.A., District Surveyor, East Hampstead.

The general body of Members was represented by :—

Mr. F. Sizer Capon, Architect's Department, L.C.C
Mr. Henry Lea, M.Inst.C.E., M.I.Mech.E., M.I.E.E.
Mr. T. Lewis Banks, F.R.I.B.A.
Mr. Harold Busbridge.
Mr. J. Howard Colls.
Mr. H. H. Ray.

The Fireproof Partition Syndicate, Ltd., was represented by :—

Mr. T. I. Cammell, Mr. H. L. Cunnah, Mr. Howard Payne, Dr. G. S. Street, and Mr. George Traill.

The following visitors attended by special invitation of the Executive:—Mr. J. C. Stransom (Architect's Department, L.C.C.), Mr. Robert Robertson (Architect's Department, L.C.C.), Mr. W. G. Perkins (Architect's Department, L.C.C.), Mr. P. G. Killick (Vestry Surveyor, Clerkenwell), Mr. J. Rush Dixon (Vestry Surveyor, Shoreditch), Mr. W. Busbridge, and Mr. W. Buchan.

Signed,

For the Sub-Committee conducting the Test:

MATT. GARBUTT (*Directing Member*).

For the Commercial Section:

FREDERIC R. FARROW.

For the Executive:

EDWIN O. SACHS (*Chairman*).

Published by the Committee as directed by the Executive.
H. S. TAYLOR
(*Assist. Secretary*).

Date—July 1*st*, 1900.

Verified a true copy of the Report ordered by the published.
WILLIAMSON, HILL & CO.
(*Solicitors*).

Date—July 15*th*, 1900.

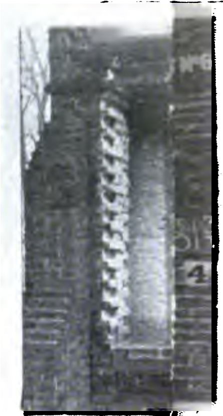


FIG. 2 TEM

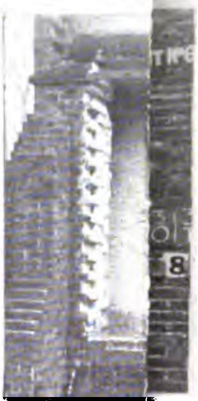


FIG. 6 TE

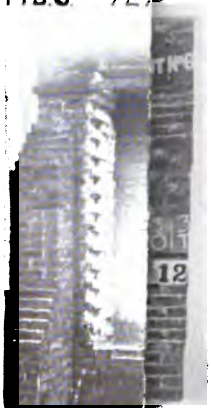


FIG. 10. TE

Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 54.

Edited by Edwin O. Sachs.

FIRE TESTS WITH DOORS.

A $2\frac{5}{8}$ IN. DOOR IN OAK, CONSTRUCTED IN THREE THICKNESSES.

A $2\frac{5}{8}$ IN. DOOR OF TEAK, CONSTRUCTED IN THREE THICKNESSES.

Particulars

OF

EXPERIMENTAL FIRE TESTS.

ALL RIGHTS RESERVED.

London, 1900.

Published at the Offices of
THE BRITISH FIRE PREVENTION COMMITTEE
(Founded, 1897—Incorporated, 1899)
1, Waterloo Place, Pall Mall.

Two Shillings and Sixpence nett.

PUBLICATIONS

OF THE

BRITISH FIRE PREVENTION COMMITTEE.

1. WHAT IS FIRE PROTECTION. A Study. By Edwin O. Sachs.
2. AMERICAN OPINIONS on FIRE PREVENTION. Abstracts from Papers. By Edward Atkinson and others.
3. THE PARIS BAZAAR FIRE. A Paper, with Illustrations. By Edwin O. Sachs.
4. THEATRE EXITS. A Paper. By Alfred Darbyshire, F.S.A., F.R.I.B.A.
5. NEW YORK FIRE DEPARTMENT. A Paper, with Illustrations. By Hugh Bonner, Chief Officer, New York.
6. COTTON FIRES and COTTON BALES. A Paper, with Illustrations. By R. H. Scotter, C.E.
7. FIRE-RESISTING FLOORS used in LONDON. A Paper, with Illustration. By Frederick Farrow, F.R.I.B.A.
8. FIRE SERVICE in FACTORIES, WORKS, Etc. A Paper, with Illustrations. By Harold Sumner.
9. LESSONS from FIRE and PANIC. A Paper. By Thomas Blashill, F.R.I.B.A., F.S.I., Superindending Architect to the London County Council.
10. HOW TO BUILD FIREPROOF. A Paper. By Francis C. Moore, President of the Continental Insurance Co., New York.
11. FIRE TESTS with UNPROTECTED COLUMNS. A Report by the Committee on "Fire-Proofing" Tests, New York.
12. THE EFFECT of FIRE. A Report on the Horne Building Fire, Pittsburg, U.S.A., with Fourteen Plates and Illustrations.
13. THE B.F.P.C. TESTING STATION. Some Descriptive Notes, with Illustrations.
14. FIRE TESTS with FLOORS. A Floor by the Expanded Metal Co.
15. CONFLAGRATIONS during the LAST TEN YEARS. A Paper, with Twenty-three Maps. By Charles E. Goad, M.Am.Soc.C.E.
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20. FIRE TESTS with GLASS. Three Casements by the British Luxfer Prism Syndicate.
21. FIRE TESTS with FLOORS. A Floor of Steel Joists, filled in with Concrete on Corrugated Iron, with a Suspended Ceiling.
22. FIRE TESTS with PARTITIONS. A Lath and Plaster Partition; a Bricked Nogged Partition.
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24. FIRE TESTS with DOORS. A 2-in. Solid-framed Teak Door; a 1-in. Four-panel Pine Door; a 1-in. Four-panel Pine Door.
25. FIRE TESTS with DOORS. A Wood Door covered with Tinned Steel Plates; an Iron Framed and Panelled Door.
26. FIRE TESTS with DOORS. A 2-in. Framed Oak Door, with 2-in. Solid Panels; a 2-in. Framed Teak Door, with 2-in. Solid Panels.
27. FIRE TESTS with PARTITIONS. A Match-boarded Partition filled in with Silicate Cotton (Slag Wool) by Messrs. T. Anderson & Son, and Messrs. T. Broadbent & Co.
28. FIRE TESTS with CEILINGS. A Ceiling of Silicate Cotton (Slag Wool) by Messrs. T. Anderson & Son, and Messrs. T. Broadbent & Co.
29. FIRE TESTS with GLASS. Three Casements glazed by the British Luxfer Prism Syndicate, Ltd.
30. FIRE TESTS with GLASS. Five Skylights glazed by the British Luxfer Prism Syndicate, Ltd.
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34. FIRE TESTS with FLOORS. A Floor of Steel Joists with Coke Breeze Concrete.
35. FIRE TESTS with DOORS. A 2-in. Framed Pitch Pine Door with 2-in. Solid Panels; a 2-in. Framed Deal Door with 2-in. Solid Panels.
36. FIRE TESTS with TREATED WOOD. "Non-Flammable" Wood by the British Non-Flammable Wood Company, Ltd., London.
37. FIRE TESTS with PARTITIONS. A Partition erected by the "Gypsine" Brick Company, Ltd., London and Paris.
38. FIRE TESTS with FLOORS. A Floor by the "Gypsine" Brick Co., Ltd., London and Paris.
39. FIRE TESTS with DOORS. A 2-in. Framed Honduras Mahogany Door with 2-in. Solid Panels; a 2-in. Framed Poplar Door with 2-in. Solid Panels.
40. FIRE TESTS with DOORS. A 2-in. Framed Austrian Oak Door with 2-inch Solid Panels; a 2-in. Framed American Walnut Door with 2-in. Solid Panels.
41. The SAFETY of THEATRE AUDIENCES and the STAGE PERSONNEL against DANGER from FIRE and PANIC. Paper. By Wm. Paul Gerhard.
42. FIRE TESTS with SAFES. A Safe.
43. FIRE TESTS with PROTECTIVE COVERINGS. Girder Coverings by the "Gypsine" Brick Company, Ltd., London and Paris.
44. FIRE TESTS with PARTITIONS. A Partition erected by the Mural and Decorations Syndicate, Ltd., London.
45. FIRE TESTS with FLOORS. A Floor and Ceiling by the Mural and Decorations Syndicate, Ltd., London.
46. FIRE TESTS with FIRE RESISTING CURTAINS. Two "Screen-Sail" Curtains by Mr. Rasmus Bugge.
47. FIRE TESTS with PARTITIONS. A Match-boarded Partition filled in with Silicate Cotton (Slag Wool) by Messrs. D. Anderson & Son, Ltd., London, and Messrs. J. C. Broadbent & Co., Ltd., London.
48. FIRE TESTS with FLOORS. A Floor of Deal Joists and Coke Breeze Concrete.

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OBJECTS OF THE COMMITTEE.

The main objects of the Committee are:—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account intended to read as expressions of opinion, criticisms, or comparisons.

NOTE.

In preparing this Report on Oak and Teak Doors, constructed in three thicknesses, there is little to remark beyond saying that it should be read in connection with reports on similar doors by way of comparison.

Attention, however, is called to the construction of the doors with the aid of wood pins, and that the boards were not grooved or tongued, but simply butt-jointed.

EDWIN O. SACHS.

LONDON,
December 31*st*, 1900.

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurrences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman.*

EXPERIMENTAL FIRE TESTS

CONDUCTED BY THE EXECUTIVE

OF THE

British Fire Prevention Committee.

[FOUNDED 1897.—INCORPORATED 1899.]

FIRE TESTS Fa & Ga.—APRIL, 11TH, 1900.

(Fa) A $2\frac{5}{8}$ in. Door of Oak, constructed in three thicknesses.

(Ga) A $2\frac{5}{8}$ in. Door of Teak, constructed in three thicknesses.

OBJECT OF TEST.

To record the effect of a fire of one hour and a quarter, gradually increasing to a temperature of 2,000° Fahr.

Note.—The fire was to be applied from one side, and the doors were to open inwards on to the fire side.

The door-openings were to be approximately 7 ft. by 3 ft.

SUMMARY OF EFFECT.

OAK DOOR.

In 60 minutes flame came through western corner and glow appeared at bottom of door.

In 67 minutes the boards at each side of centre joint bulged outwards $1\frac{1}{2}$ in. and joint opened.

In 75 minutes opening in the centre widened and flames came through freely; the flames at top of door had extended across the whole width.

Two of the three thicknesses had disappeared, the outer thickness remaining in position.

TEAK DOOR.

In 17 minutes flame appeared at western top corner.

In 36 minutes the flame had extended across two-thirds of top of door.

In 57 minutes glow appeared at bottom of door.

In 75 minutes flames had extended across the whole of the top of door and holes along bottom.

The inner thickness had disappeared; the centre thickness was charred through, but in position; the outer thickness had about 4 in. at the top burnt away.

DESCRIPTION OF THE TESTING PLANT.

(See Figs A, B, C *and* D.*)*

The Testing Chamber used was located at the Committee's Testing Station, and was known as No. 6 Hut.

The hut was constructed, as shown, of stock bricks with lime mortar, and measured 10 ft. by 10 ft. internally.

The ceiling of the hut was 9 ft., 6 in. above the pavement of the chamber, and was formed of solid wood beams grouted with fire-clay. The chamber measured 10 ft. by 7 ft. 10 in.

A brick wall, 14 in. thick, was built across the hut from east to west, 13 in. to the south of the north wall, and carried up to the ceiling; there were two openings in this, 7 ft. high and 3 ft. 3 in. wide, arched over with brick arches in two half-brick rings, and the spaces between the arches and the frames were filled in with bricks. The wall was built of gauged stuff.

The fuel used was gas produced at the station, and the supply was regulated by valves and dampers.

The gas was admitted through two mixing chambers of fire-brick, as shown.

Two Roberts-Austen pyrometers were used for recording temperatures, to take four observation records from points Nos. 1, 2, 3 and 4, points Nos. 2 and 3 being outside the doors, and the others on the fire side of the t

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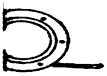
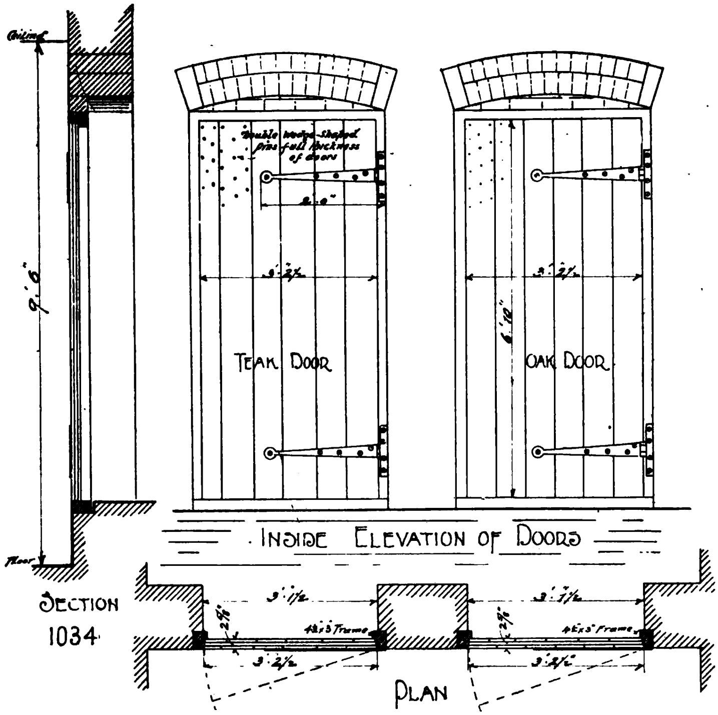


doors. A continuous record was also taken from point No. 5, on the fire side.

There were observation holes on the east and west walls, closed by moveable iron shutters.

The draught holes were in the east and west walls.

The photographs were taken by daylight.



Figs. E, F. Details of Doors.

CONSTRUCTION OF THE DOORS.

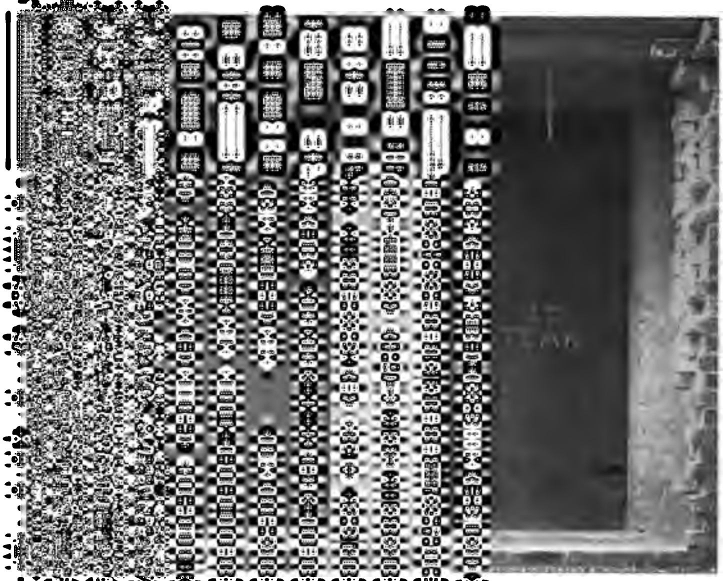
(See Figs. E *and* F.*)*

The door on the east side was of oak, and that on the west side of teak.

The doors were of the same style and constructed in the same manner, being 6 ft. 10 in. high, by 3 ft. 2½ in. wide, and formed of three thicknesses of ⅞-in. boards, between 6 in. and 7 in. wide.

[illegible] ngued, but simply [illegible] er by ⅜-in. double [illegible] e material as the [illegible] ness of the door, [illegible]

[illegible] rought iron cross [illegible] l frames, nine 1-in. [illegible] lso secured on the [illegible]



[illegible] Teak.

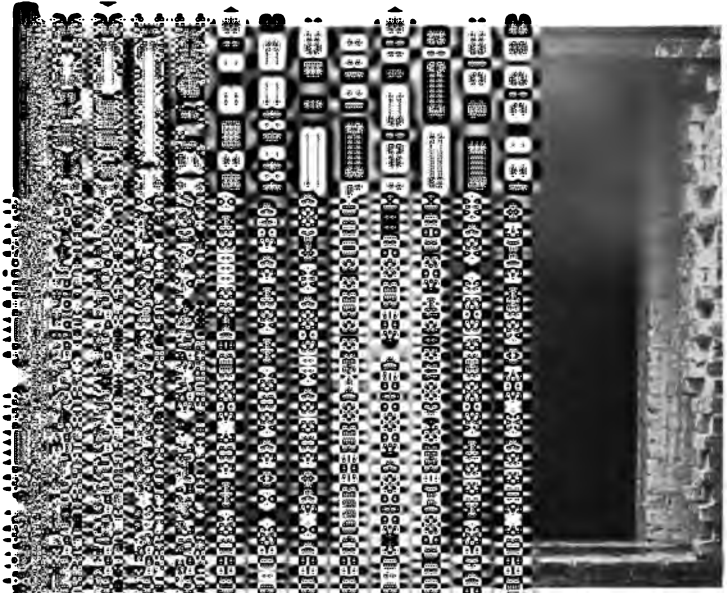
[illegible] cement of Test.

[illegible] lts (two at the top [illegible] the same material [illegible]

[illegible] ated and splayed, [illegible]). and were secured [illegible]

[illegible] d the frames were [illegible] ertaken. The

at 3 p.m., at
d as follows :—



AK.

5.21 P.M., AFTER

W.; Barometer,
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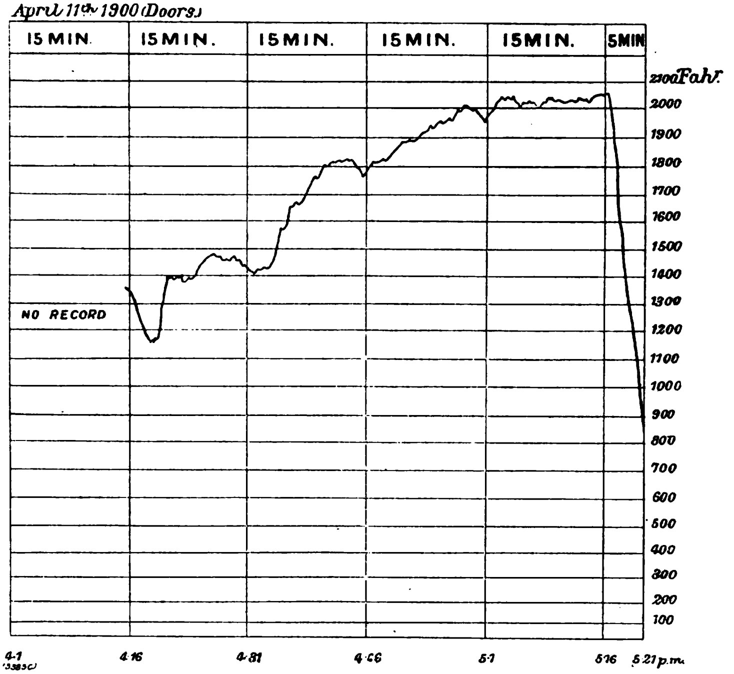
ecord from point

OBSERVATIONS TAKEN AT POINTS NOS. 1, 2, 3 & 4.

From 4.10 *p.m. to* 5.19 *p.m.—April* 11*th*, 1900.

	INSIDE.		OUTSIDE	
TIME.	NO. 1. Fahr.	NO. 4 Fahr.	NO. 2. Fahr.	NO. 3. Fahr.
4.10 p.m.	950°	900°	—	—
4.13 „	1,200°	1,300°	—	—
4.16 „	1,100°	1,150°	—	—
4.19 „	1,250°	1,400°	—	—
4.22 „	1,250°	1,380°	—	150°
4.25 „	1,350°	1,460°	—	210°
4.28 „	1,350°	1,450°	—	200°
4.31 „	1,320°	1,400°	—	175°
4.34 „	1,450°	1,520°	—	150°
4.37 „	1,600°	1,600°	—	200°
4.40 „	1,700°	1,710°	—	190°
4.43 „	1,750°	1,775°	—	190°
4.46 „	1,710°	1,750°	—	175°
4.49 „	1,800°	1,800°	—	150°
4.52 „	1,800°	1,800°	—	150°
4.55 „	1,880°	1,880°	—	140°
4.58 „	1,900°	1,900°	—	150°
5.1 „	1,900°	1,900°	—	200°
5.4 „	1,940°	1,940°	—	210°
5.7 „	1,950°	1,950°	—	250°
5.10 „	1,950°	1,960°	—	300°
5.13 „	1,950°	1,970°	—	460°
5.16 „	1,960°	1,980°	175°	600°
5.19 „	14,00°	1,500°	250°	600°

AUTOMATIC RECORD AT POINT NO. 5.



Wednesday, April 11*th*, 1900.

OAK DOOR.	TEAK DOOR.
At 4.1 p.m. gas lighted.	At 4.1 p.m. gas lighted.
Observations from the outside.	*Observations from the outside.*
At 4.7 p.m. smoke came through the joint between top of door and frame.	At 4.7 p.m. smoke came through the joint between top of door and frame.
	At 4.18 p.m. (17 minutes) flame appeared at western top corner of door. (See Fig. H, 4.22 p.m., and Fig. 3, 4.22 p.m.—21 minutes.)
At 4.20 p.m. moisture exuded along top of door, and also slightly on upper part of west side.	

At 4.30 p.m. moisture exuded also along bottom of door.

At 4.40 p.m. more moisture at top and bottom of door, but not at west side. Smoke issuing from western top corner.

At 4.48 p.m. moisture at bottom and east side of door, and also exuding through pins all over the door. The door had warped away from rebate, $\frac{3}{8}$ in. at centre of east side, $\frac{3}{16}$ in. at centre of west side.

At 5.1 p.m. flame first came through top western corner, and glow appeared at bottom of door near eastern corner. (See Fig. J, 5.1 p.m.—60 minutes, also Fig. 9, 5.2 p.m.)

At 4.30 p.m. flame continued, but not so fiercely as at first. Oil exuded down the west side.

At 4.35 p.m. flame had extended across two-thirds of top of door, and 4 inches down west side. (See Fig. 5, 4.37 p.m.—36 minutes.)

At 4.40 p.m. flame had lessened.

At 4.50 p.m. flames continued to issue from western corner. (See Figs. 6 and 7, 4.47 p.m. and 4.52 p.m.)

At 4.57 p.m. one flash of flame appeared below bolt at lower western corner.

At 4.58 p.m. glow appeared through centre of bottom of door, and at lower western corner.

At 5.1 p.m. the glow at centre had become stronger, and that at western corner had developed into a hole. (See Fig. J., 5.1 p.m.—60 minutes.)

At 5.8 p.m. flames at top western corner; strong glow all along bottom of door.

Five holes appeared down the centre joint of outer thickness, the two centre boards bulging outwards 1½ ins. at centre joint.

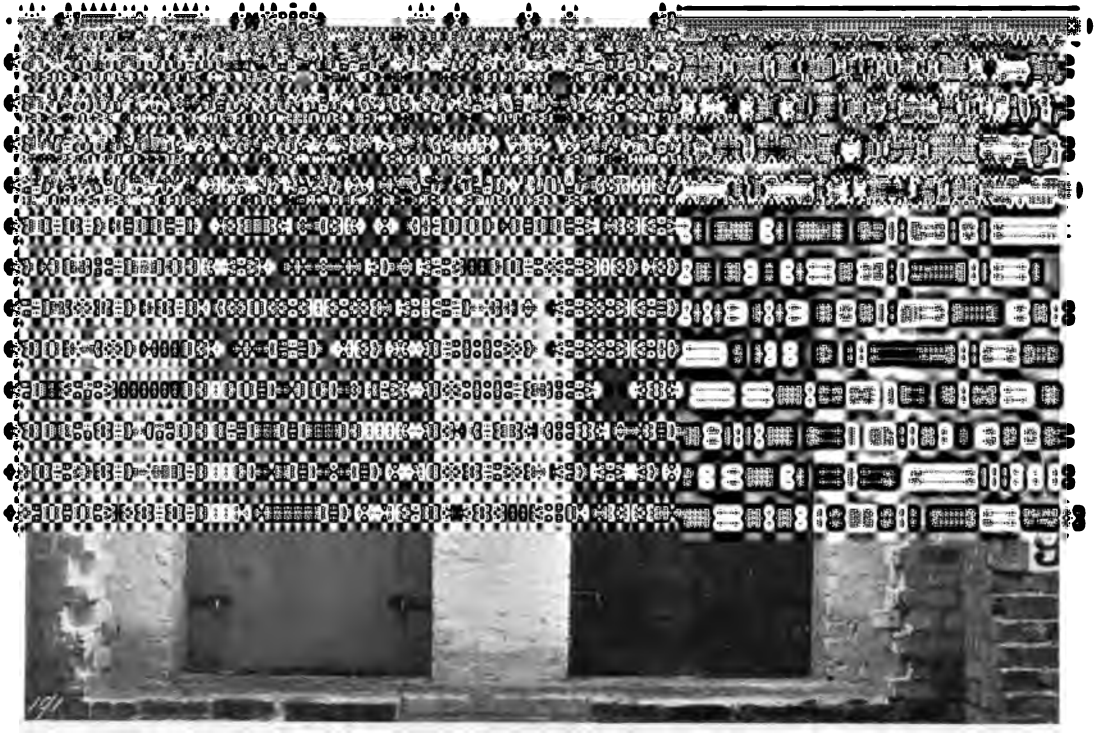
At 5.13 p.m. flames had extended half way along top, and also appeared at eastern top corner.

Flame came through parts of centre joint, the three upper holes having extended and joined; the lower two holes in centre joint remaining as a strong glow.

The glow along bottom of door had become stronger. (See Figs. K, 5.10 p.m.—69 minutes; also L, 5.13 p.m. —72 minutes; and Fig. 11, 5.12. p.m.)

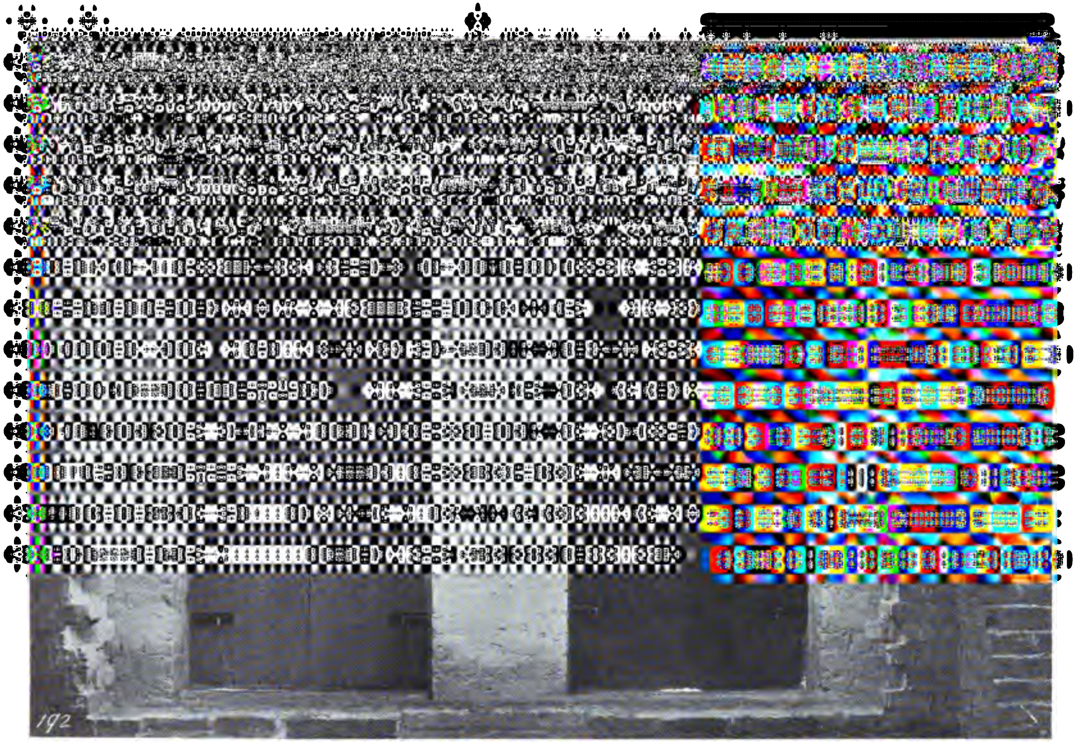
At 5.10 p.m. flame at top of door had increased considerably. Both glow spots at bottom had developed into holes. (See Fig. K, 5.10 p.m.—69 minutes; also Fig. 11, 5.12. p.m)

At 5.15 p.m., in addition to the above, a hole had appeared at eastern lower corner. (See Fig. M, 5.16 p.m.—75 minutes; also Fig. 12, 5.17. p.m.)



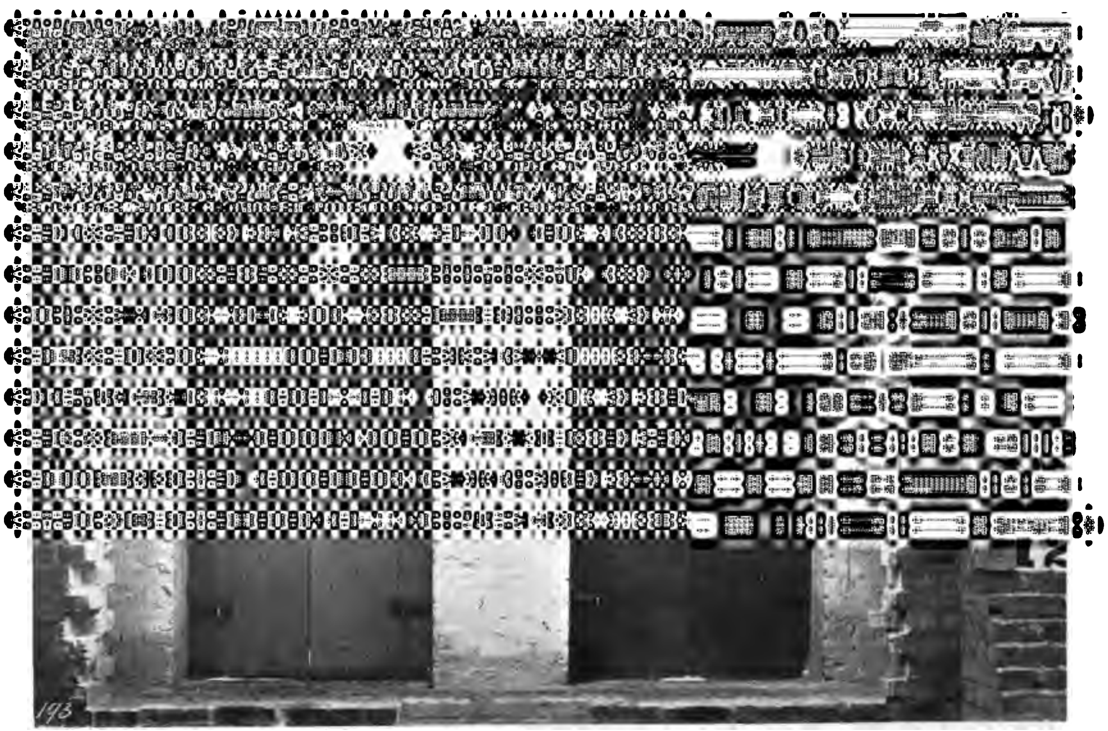
Oak. Teak.

Fig. J. View Showing Condition of Doors after 60 Minutes.



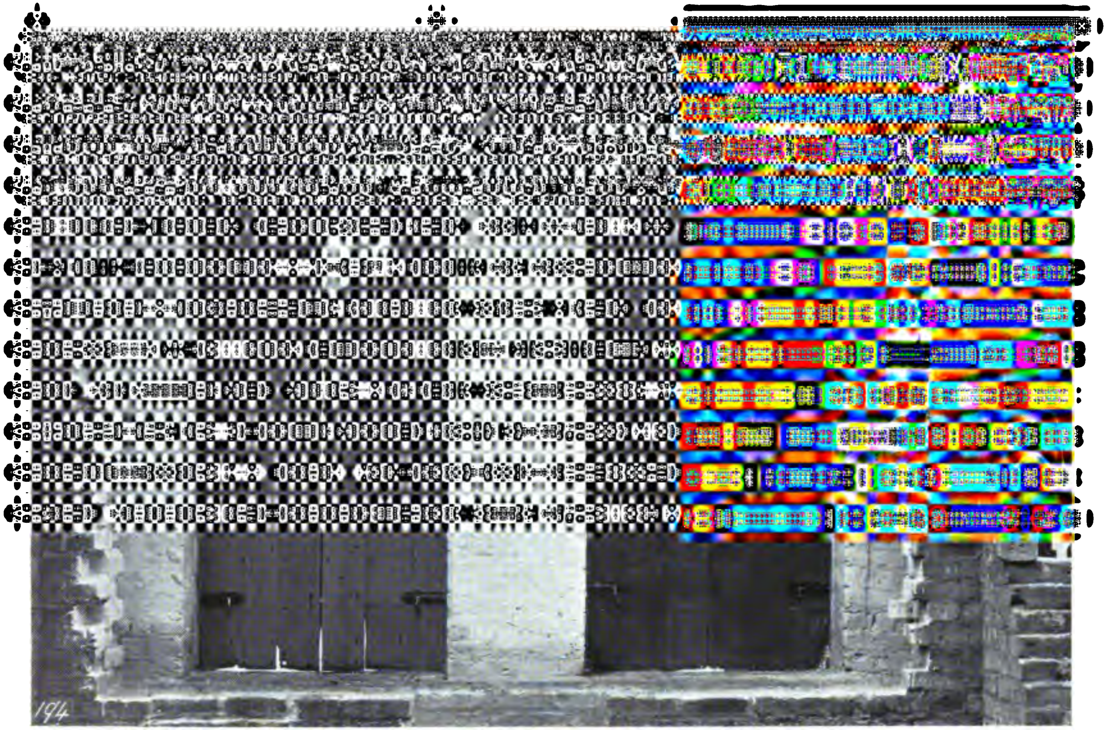
Oak. Teak.

Fig. K. View Showing Condition of Doors after 69 Minutes.



Oak. Teak.

Fig. L. View Showing Condition of Doors after 72 Minutes.

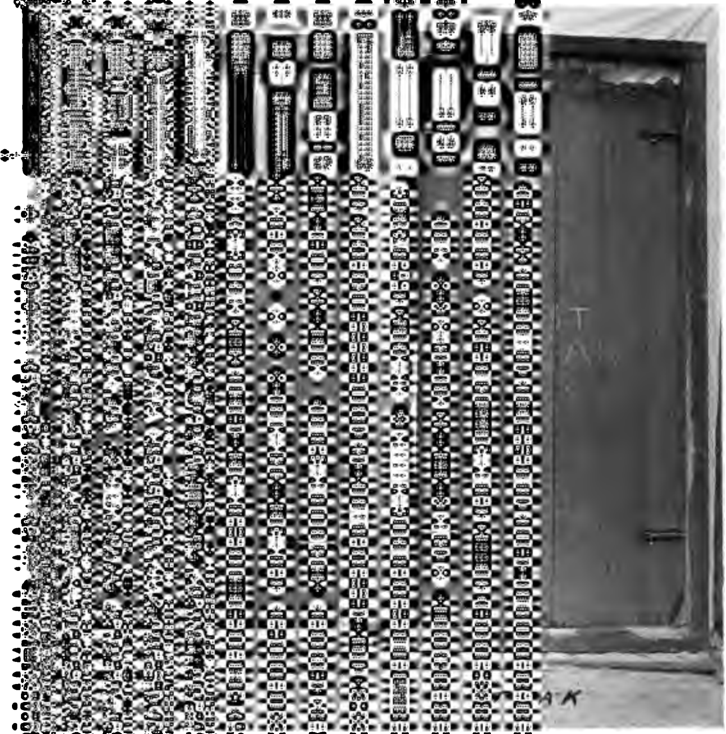


OAK. TEAK.

Fig. M. VIEW SHOWING CONDITION OF DOORS AFTER 75 MINUTES.

[illegible] .m. gas shut off.

[illegible] p.m. water ap- [illegible]



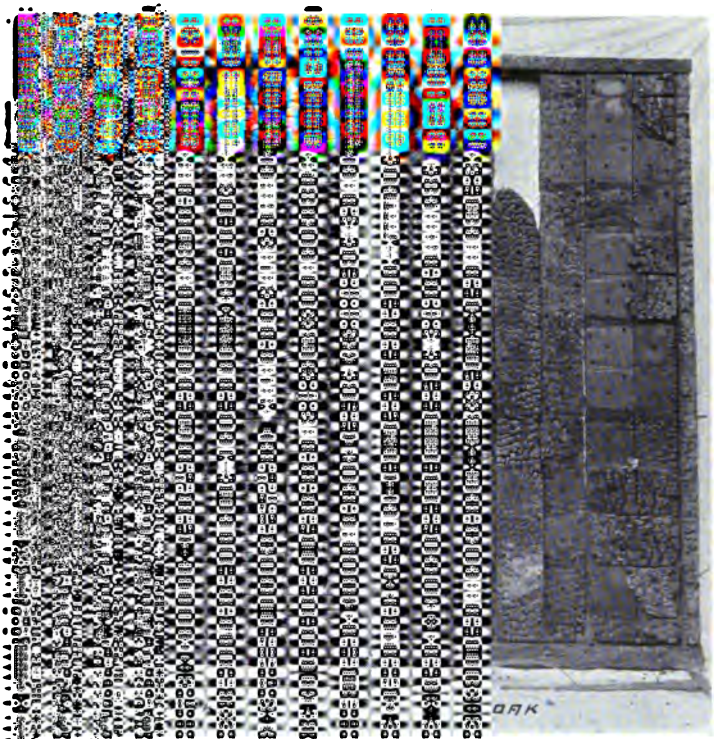
[illegible] Outside of Doors [illegible]

[illegible] *s on the inside.*

[illegible] .m. door well [illegible] ting at eastern [illegible] corner.

[illegible] p.m. blazing all [illegible]

[illegible] about 4.30 p.m., at [illegible] one door, and [illegible] red black appear- [illegible] these intervals were [illegible] uld become again [illegible]



[illegible] Inside of Doors [illegible]

[illegible] menon ceased, and [illegible] usly on the inside.

At 4.30 p.m. burning freely.	At 4.30 p.m. burning freely.
At 4.45 p.m. the inner thickness appeared to be burnt through, and the charred particles began to curl up.	At 4.45 p.m. the inner thickness had the appearance of being charred through, but the surface had not begun to disintegrate.
At 4.48 p.m. charred particles of inner thickness began to fall off.	
At 5.0 p.m. nearly all of inner thickness had disappeared, the centre thickness being much charred, but still retaining its form.	At 5.0 p.m. some of inner thickness had fallen, but not more than about one half.
At 5.7 the lower hinge was quite detached from door.	At 5.7 the lower hinge had buckled, the end being detached from door (it fell soon afterwards).
At 5.10 lower hinge had fallen off.	

Note.—The upper hinges of both doors fell off before conclusion of test: the inside of hut was so full of flame that the hinges were not visible after 5.10.

OBSERVATIONS AFTER TEST.

(See Figs. N, O *and* P.*)*

OAK DOOR.	TEAK DOOR.
The whole of the inner thickness had disappeared.	The whole of the inner thickness had disappeared, excepting one small piece of charred wood on eastern (hinge) side.
The centre thickness had also gone, with the exception of a few pieces of charred particles on the eastern (hinge) side.	The centre thickness was in position, but was almost entirely charred.

The outer thickness remained in position, most of its inner surface being charred, the outer surface being intact, excepting the upper portions of three boards. (See Figs. O and P.)

The frame was deeply charred, especially at the head, the sill being not much damaged.

The outer thickness was practically unharmed except for about 4 ins. at the top, where flames had broken through, and for small holes at eastern lower corner, and at centre of bottom of door. (See Figs. O and P.)

The frame was deeply charred, especially at the head, the sill being not much damaged.

GENERAL ARRANGEMENTS.

The test was carried out according to the procedure laid down by the Executive for investigations of this description and conducted by a Sub-Committee of the Executive, comprising :—

Mr. Chas. E. Goad, M.Am.Soc.C.E., M.Can.Soc.C.E. (Directing Member).
Mr. Ellis Marsland, District Surveyor, Camberwell.
Mr. F. Hammond, F.R.I.B.A., District Surveyor, East Hampstead.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.

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The Fireproof Partition Syndicate was represented by:—

Mr. T. I. Cammell, Mr. H. L. Cunnah, Mr. Howard Payne, Dr. G. S. Street, Mr. George Traill.

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Mr. P. Stransom, Architect's Department, L.C.C.; Mr. Robert Robertson, Architect's Department, L.C.C.; Mr. W. G. Perkins, Architect's Department, L.C.C.; Mr. P. G. Killick, Vestry Surveyor, Clerkenwell; Mr. J. Rush Dixon, Vestry Surveyor, Shoreditch; Mr. W. Busbridge; Mr. W. Buchan.

Signed,

For the Sub-Committee conducting the Test:
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For the Commercial Section;
FREDERIC R. FARROW.

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EDWIN O. SACHS (*Chairman*).

Published by the Committee as directed by the Executive.
H. S. TAYLOR
(Asst. Secretary).
Date—December 31st, 1900.

Publications of the

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Edited by Edwin O. Sachs.

FIRE TESTS WITH FLOORS.

A FLOOR
OF
DEAL JOISTS AND COKE BREEZE CONCRETE
WITH
EXPANDED METAL AND PLASTER CEILING.

Particulars
OF
EXPERIMENTAL FIRE TEST.

ALL RIGHTS RESERVED.

LONDON, 1900.

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OBJECTS OF THE COMMITTEE.

The main objects of the Committee are :—

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimising the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts, and translations.

To undertake such independent investigations and tests of materials, methods and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account intended to read as expressions of opinion, criticisms, or comparisons.

NOTE.

In the report presented herewith the effect of a fire of two hours duration is recorded in respect to a floor of ordinary soft wood joists filled in with concrete, the concrete, however, affording protection to the joists from below, and the soffit comprising a plaster ceiling on "expanded metal" lathing, this lathing having at the same time been employed for purposes of construction in the place of the usual centering which is generally applied where concrete fillings are specified.

This report should be read in conjunction with the reports on floors where ordinary iron or wood joists were used without a protective covering.

EDWIN O. SACHS.

LONDON,
May 4th, 1900

THE GENERAL ARRANGEMENTS FOR TESTS.

(*MEMORANDUM.*)

The purpose of the tests undertaken by the British Fire Prevention Committee is to obtain reliable data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice.

The tests are of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. Absolute reliability is assured, records being mostly taken automatically, or by photography, and the temperatures being easily regulated by the application of gas.

All reports on tests solely state the bare facts and occurences, with tables, diagrams and illustrations, and on no account are reports to include expressions of opinion, nor should any expression be read as a comparison or criticism.

The general arrangement and direction of the tests are in the hands of the Executive, who act in accordance with certain principles laid down after careful study and experiment. The official tests are attended by the members of the Council and the members of the Committee in rotation.

As to the Testing Station, it comprises two houses standing in their own grounds near Regent's Park, and backing on to the Regent's Canal. The principal building is used for Committee Rooms and laboratory purposes, whilst the gardens are utilised for so-called "full-size" tests.

As to the financial aspect of the station, the establishment expenses are being met by a special subscription. As far as the funds of the Committee permit, investigations and experimental tests with ordinary (*i.e.*, not patented) forms of construction are undertaken from time to time and duly reported on. Official tests with patented materials, makers' systems, etc., etc., are subject to a scale of charges, but these charges are so figured as to only just cover the actual cost. Any surplus is refunded. The Testing Station is also open to members for such private research work or tests they may desire to undertake.

The services of the members participating in the management of the station, conducting or attending tests, are given entirely gratuitously.

For the Executive,

EDWIN O. SACHS, *Chairman*

EXPERIMENTAL FIRE TESTS

CONDUCTED BY THE EXECUTIVE

OF THE

British Fire Prevention Committee.

[FOUNDED, 1897.—INCORPORATED, 1899.]

FIRE TEST No. Fa.—MARCH, 28TH, 1900.

A Floor of Deal Joists and Coke Breeze Concrete, with Expanded Metal and Plaster Ceiling.

OBJECT OF TEST.

To record the effect of a fire of two hours, commencing with a temperature of 500° Fahr., gradually increasing to a temperature not exceeding 2,300° Fahr., followed by the application of a stream of water for two minutes.

Note.—The area of the floor under investigation was to be 100 feet superficial in the clear (10 ft. by 10 ft.).

The floor was to be loaded with 100 lbs. per foot distributed.

The time allowed for construction and drying was four weeks (Winter).

SUMMARY OF EFFECT.

In 28 minutes plaster began to fall in patches from the ceiling, and continued to fall at intervals till the end of the test, when water was applied and further plaster was washed away.

No other effect of the fire was noticeable, and at the conclusion of the test the floor was intact and carried its load.

DESCRIPTION OF TESTING PLANT.

(*See Figs.* 1 *to* 4.)

The testing chamber was located at the Committee's Testing Station, and was known as "No. 2 Hut."

The chamber was constructed, as shown, of stock bricks with lime mortar, and measured 10 ft. by 10 ft. internally.

The ceiling of the floor tested was 7 ft. 6 in. above the pavement of the chamber.

The door-opening on the south side measured 2 ft. 6 in. by 6 ft. 6 in., and was bricked up on the morning of the test.

The fuel used was gas produced at the station, and the supply was regulated by valves and dampers.

The gas was admitted through two mixing chambers of fire-brick, each 10 ft. by 3 ft., as shown.

Two Robert-Austen pyrometers were used for recording temperatures, the first to take a continuous record from point No. 5, and the second to take four observation records from points 1, 2, 3, and 4.

The load was of bricks, distributed evenly over the surface of the floor.

There were two observation holes in the north wall, one in the east wall, one in the west wall and one in the south wall in door-opening.

The draught holes were in the east and west walls.

The photographs were taken partly by daylight and partly by flashlight.

The stream of water was applied through a branch with $\frac{1}{2}$-in. nozzle, and supplied from a manual fire-engine equipped with a pressure gauge.

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1, Waterloo Place, Pall Mall, London, S.W.

13½ in. centre to centre, were fixed; they ran north and south, and rested on the offsets of the walls, 4½ in. at each end.

On one side of each joist, and running the whole length, a strip of expanded metal, 5 in. deep, ¾ in. mesh, 16 gauge, was secured with 1 in. staples. This was brought below the joists 2 in., and the strands of the lower mesh were cut in two and bent back, forming a hook for the support of the lathing used for ceiling and centering (see Fig. 5).

On each side, and along the whole length of each joist, a 1 in. by ¾ in. wood fillet was nailed, two inches from the lower edge.

On March 1st, expanded metal lathing was fixed, and used both for the centering and to carry the plaster of ceiling. This was in widths of 2 ft. 3 in., and known as No. 1 lathing, ⅜ in. mesh, 24 gauge, $\frac{3}{32}$ strand.

This horizontal lathing was secured to the vertical strips of lathing, nailed to the joists before mentioned, by cutting and bending the strands of the lower mesh, and it was further secured with No. 18 gauge galvanized iron wire (see Fig. 5).

The concrete below the joists was then filled in. This was 2 in. thick, and made of small dry ashes and Portland cement, in the proportion of six parts of ashes to one part of cement. It was turned over four times dry and four times wet, 34·50 gallons of water being used to ¾ yd. of material.

It was carried to the floor in buckets, emptied, and spread over the surface and well pushed under the joists with a trowel.

On March 6th the concrete between the joists was put in. This was 5 in. thick, made in the proportion of three parts of coke breeze, two parts of dry ashes, one part of clinkers broken sufficiently small to pass a 1 in. mesh, and incorporated with one part of Portland cement. It was mixed four times dry and four times wet, 21.55 gallons of water being used to each ¾ yd. of material. The ashes and clinkers before being used were quite dry, the coke breeze being slightly damp.

The concrete was carried to the root in buckets, emptied, and spread over the surface between the joists and stamped down lightly with the feet, and levelled with a trowel.

The hut was covered with a tarpaulin, until March 21st, when it was removed to enable the deal flooring to be laid. This was ⅞ in. thick and in 6-in. widths, nailed to joists with floor brads, two nails to each joist. After the flooring was laid the hut was again covered with a tarpaulin until the morning of the test.

On March 12th the ceiling was plastered one coat. The coarse stuff, supplied by a local contractor, ready made, was stated to consist of lime, sand, and hair, in the proportion of 1 yd. of sand, 6 bushels of lime, and 14 lbs. of hair.

Owing to the uneven surface of the lathing, caused by the weight of concrete above, some parts of the ceiling were thicker than others, and the plaster averaged at least 1 in. thick.

On March 13th one coke fire was put into the hut and kept in all day, and on the following day the plasterer went over the ceiling with a "float." The floor was then left until the test began.

On March 19th one coke fire was lighted in the hut and was kept in daily till March 24th.

Note.—The 7 inches of concrete when dry weighed about 40 lbs. per foot super. The weight per cubic foot was about 67 lbs.

On March 6th, during the operation of concreting, the weather report was as follows:—State of weather, overcast; Rain, none; Wind, N.N.W.; Barometer, 30·18 in. Attached Thermometer, 42° Fahr.; Dry Bulb, 38° Fahr.; Wet Bulb, 35·2° Fahr.; Remarks, dry afternoon, very cold.

During March the rainfall for the month (taken at Camden Square) was ·79 inches, with a maximum of ·41 inches on March 18th. The maximum temperature was 58·6° Fahr. (March 12th); minimum, 23·4° Fahr. (March 18th).

PREPARATIONS FOR THE TEST.

On March 26th and 27th, the area of the floor, to an extent of 81 square feet, was loaded with bricks weighing 8,100 lbs., making a load equal to 100 lbs. per square foot.

THE TEST.

On March 28th the test was undertaken. The following is the log of the test:—

At 3.37 p.m. the floor was intact.

At 3 p.m. the Meteorological observations taken at he Botanic Gardens, Regent's Park, read as follows:—

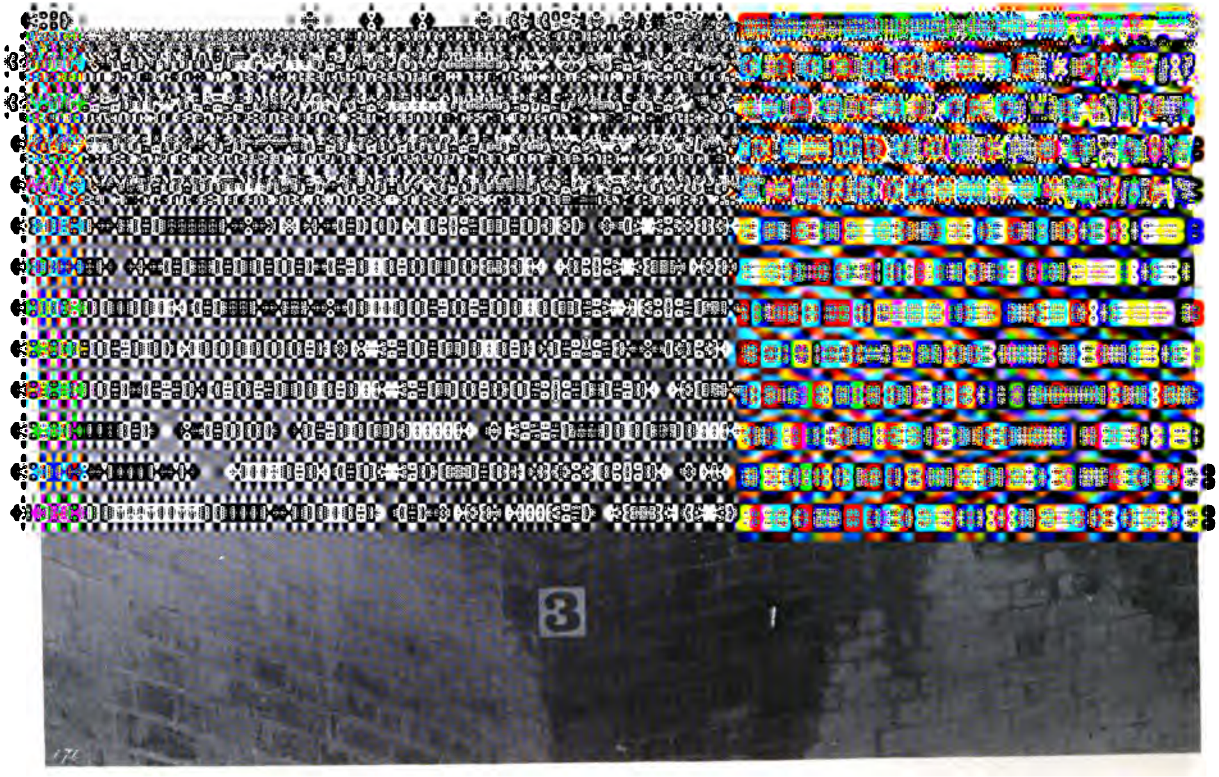
State of weather, overcast; Rain, none; Wind, N.N.E.; Barometer, 29·54 in.; Attached Thermometer, 43° Fahr.; Dry Bulb, 39·2° Fahr.; Wet Bulb, 36·8° Fahr.; Remarks, dull afternoon, cold, hazy.

The table and diagram given below show the temperatures taken from the five pyrometer observation points in the hut, as shown on the drawings as Nos. 1, 2, 3 and 4, and one automatic record from point No. 5.

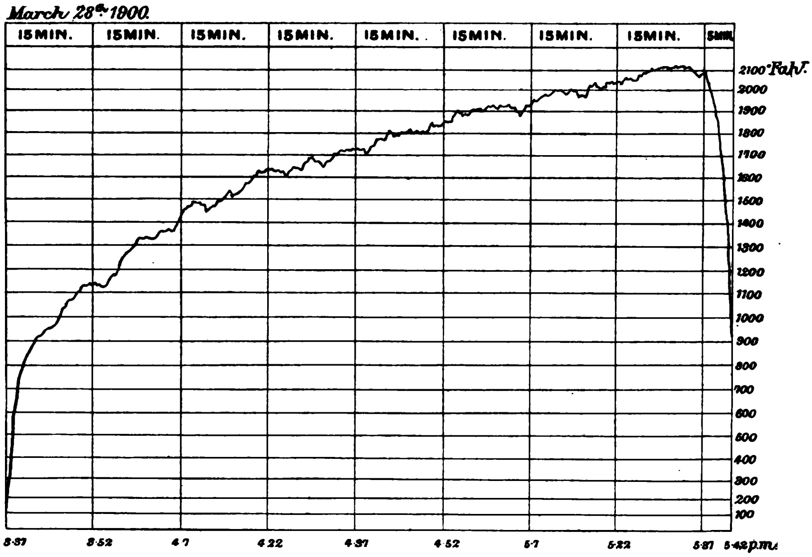
OBSERVATIONS TAKEN AT POINTS NOS. 1, 2, 3 AND 4.

From 3.51 *p.m. to* 5.41 *p.m.*

TIME.	No. 1	No. 2	No. 3	No. 4
	Fahr.	Fahr.	Fahr.	Fahr.
3.51 p.m.	675°	700°	800°	650°
3.56 „	875°	980°	980°	850°
4.1 „	1,000°	1,125°	1,150°	950°
4.6 „	1,120°	1,200°	1,300°	1,070°
4.11 „	1,200°	1,275°	1,360°	1,150°
4.16 „	1,320°	1,400°	1,550°	1,280°
4.21 „	1,375°	1,450°	1,550°	1,300°
4.26 „	1,470°	1,520°	1,700°	1,400°
4.31 „	1,500°	1,550°	1,700°	1,450°
4.36 „	1,530°	1,610°	1,750°	1,500°
4.41 „	1,600°	1,640°	1,800°	1,550°
4.46 „	1,650°	1,680°	1,860°	1,600°
4.51 „	1,700°	1,720°	1,900°	1,640°
4.56 „	1,700°	1,750°	1,900°	1,650°
5.1 „	1,780°	1,800°	1,960°	1,720°
5.6 „	1,820°	1,840°	1,960°	1,750°
5.11 „	1,900°	1,900°	2,000°	1,800°
5.16 „	1,900°	1,900°	2,020°	1,800°
5.21 „	1,920°	1,950°	2,050°	1,850°
5.26 „	2,000°	2,000°	2,080°	1,900°
5.31 „	2,000°	2,025°	2,100°	1,900°
5.36 „	2,000°	2,020°	2,100°	1,900°
5.41 „	1,500°	1,100°	750°	1,200°



THE FLOOR. *Fig.* 7. VIEW FROM BELOW AFTER TEST.



At 3.37 p.m. the gas was lighted.

At 4.5 p.m. about 1½ ft. super of plaster had fallen from the ceiling at the N.W. corner, exposing the metal lathing. The centre of the fallen patch was about 2 ft. 3 ins. from the west wall and 9 ins. from the north wall.

At 4.9 p.m. two more pieces of plaster had fallen, one piece, having an area of about 1 ft., close to the centre of the north wall, and the other piece, about 2 ft. in area, in the N.E. corner.

At 4.12 p.m. the plaster to ceiling all along the north side of hut and about 12 ins. from the north wall was in a damaged condition.

At 4.15 p.m. the plaster to ceiling for a width of about 12 ins. from the east and west walls bulging and blowing off, but only the surface affected, the lathing not being exposed.

Also a piece of plaster about 2 ft. by 9 ins. had fallen from the ceiling, about 2 ft. away from south wall, exposing the lathing.

At 4.19 p.m. a piece of plaster about 9 ins. by 9 ins. had fallen from the S.W. corner, and a blister was forming against the wall.

At 4.20 p.m. the plaster to ceiling all along the south side of hut and about 12 ins. from south wall was blistered and damaged.

At 4.25 p.m. the margin of the ceiling, about 12 ins. all round the hut, had its surface destroyed, but the centre part was generally unaffected, with the exception before mentioned at 4.15 p.m.

At 4.27 p.m. a blister forming in plaster, having its centre about 4 feet from east wall and 3 feet from south wall, and with a crack about 12 ins. long running east and west.

At 4.38 p.m. steam arising in considerable volume from the upper surface of floor at junction with north wall, and a little smoke arising from a corresponding position on the west.

At 4.45 p.m. a thermometer placed on the top surface of the concrete under the boards at the N.W. corner registered 80° Fahr.

At 4.53 p.m. the same thermometer registered 98°. The blister on ceiling referred to at 4.15 p.m., extending towards S.W. corner, and the plaster dropping off, exposing the metal lathing.

At 4.55 p.m. the external thermometer registered 120°.

At 5.20 p.m. the external thermometer registered 160°.

At 5.37 p.m. the gas was turned off.

At 5.39 water was applied to the soffit of floor through a half-inch jet at about 20 lbs. pressure. The effect of this was to wash the plaster off the ceiling where it was struck by the water, exposing the metal lathing.

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At 5.41 p.m. the water was shut off and the test concluded.

Note.—The floor at the conclusion of the test showed little, if any, deflection.

OBSERVATIONS AFTER TEST.

(See Figs. 6, 7 *and* 8*).*

On March 29th the load was removed. It was found that the wooden joists had ignited, and the floor boards were burnt through in patches (see Fig. 6).

Note.—The fire had been smouldering all night, and water was applied to extinguish it.

The photographs shown in Figs. 6 to 8 were taken.

On the same day at 4 p.m. some of the floor boards were removed and the wooden joists examined.

It was found that all the joists had been more or less damaged by the fire smouldering all night, portions of them were quite consumed, leaving the matrix only in the concrete.

The least damaged of the 9 joists forming the floor was the centre one, and this was intact but for a piece about 12 inches long and 5 inches deep, which was consumed about 15 inches distant from south end.

The floor had deflected 2¾ inches.

On examining the soffit it was found that all the plaster had fallen, with the exception of about half-a-yard at the S.W. corner.

The metal lathing was exposed and a patch about 12 inches by 6 inches by the N.W. corner was found to be partly fused.

There were straight joints in the lower 2 inches of concrete in line with the vertical pieces of expanded metal fixed to the sides of the joists, to which the horizontal lathing was hung. The two inches of concrete, formed of dry ashes and Portland cement, was loose and disintegrated, but the remainder of the concrete was sound and unaffected by the fire.

GENERAL ARRANGEMENTS.

The test was carried out in accordance with the pro cedure laid down by the Executive for investigations of this description, and conducted by a Sub-Committee, comprising:—

Mr. Ellis Marsland, District Surveyor, Camberwell.
Mr. Max Clarke, A.R.I.B.A.
Mr. Matt. Garbutt, A.R.I.B.A., A.M. Inst. C.E.

Mr. Thomas Kissack, Resident Engineer at the Testing Station, assisted the Sub-Committee.

Mr. H. B. White, M.I.E.E., superintended the instrument room.

The Council was represented by:—

Sir John Taylor, K.C.B., H.M. (Office of Works).
Mr. Arthur Cates, F.R.I.B.A. (late Surveyor Crown Estates).

The Executive was represented by:—

Mr. Edwin O. Sachs (Chairman).
Mr. Chas. E. Goad, M.Am.Soc.C.E.
Mr. F. Hammond, F.R.I.B.A., District Surveyor E. Hampstead.

The Members' Testing Sub-Committee was represented by Mr. G. E. Monckton, M.A.

The Commercial Section was represented by:—

Mr. F. R. Farrow, F.R.I.B.A. (Chairman).
Lieut.-Col. J. Colquhoun (London Non-Flammable Wood Co.).

Mr. J. F. Golding (The Expanded Metal Co.).
Mr. J. D. O'Brien (The Columbian Fireproofing Co.).
Mr. J. A. King (Messrs. J. A. King & Co.).
Mr. H. Salmon (The Expanded Metal Co.).
Mr. H. B. Tarry (The British Uralite Co.).
Mr. D. R. Ratcliffe (The Ratner Safe Co.).
Mr. A Williams (G. A. Williams & Son).
Mr. Gilbert Davenport (The Expanded Metal Co.).

The general body of members was represented by:—

Mr. J. F. Dyer, Vice-Pres. National Fire Brigades' Union.
Mr. F. S. Capon, Architect's Dept., L.C.C.
Mr. Arthur Crow, A.R.I.B.A. (District Surveyor, Whitechapel).
Mr. Bernard Dicksee, A.R.I.B.A. (District Surveyor, E. Newington).
Mr. E. Dru-Drury, F.R.I.B.A. (District Surveyor, St. Margaret's).
Mr. W. Grellier, F.R.I.B.A. (District Surveyor, Clapham).
Mr. F. W. Hamilton, A.R.I.B.A. (District Surveyor, N. Fulham).
Mr. E. R. Hewitt, A.R.I.B.A. (District Surveyor, St. Saviour's).
Mr. Geo. McDonell, A.R.I.B.A. (District Surveyor, Islington, S.W.).
Mr. Hugh McLachlan, A.R.I.B.A. (District Surveyor, West Division, City of London).
Mr. R. Notley, F.R.I.B.A., F.S.I. (District Surveyor, Bethnal Green).
Mr. J. P. Norrington, A.M. Inst. C.E. (Surveyor, Lambeth).
Mr. W. Weaver, M. Inst. C.E. (Surveyor, Kensington).
Mr. F. E. Eiloart.
Mr. A. Fernhead.

The following visitors attended by special invitation of the Executive :—

Mr. A. E. Buthrey, Mr. A. Howard Colls, Mr. T. Costigan (Sec. Builders' Institute), Mr. Coward, Mr. Howard Dru-Drury, Mr. Friswell, Mr. T. E. Gatehouse, F.R.S. Ed., Mr. Hamsley, Mr. E. R. Marsland, Mr. W. G. Perkins, Mr. H. Rogers, Mr. E. S. Young.

Signed,

For the Sub-Committee conducting Test:
ELLIS MARSLAND (*Directing Member*).

For the Commercial Section:
FREDERIC R. FARROW.

For the Executive:
EDWIN O. SACHS (*Chairman*).

Published by the Committee as directed by the Executive.
H. S. TAYLOR,
(*Assist. Secretary.*)

Date—May 1st, 1900.

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